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CONTENTS

The New Agricultural Economics ..... *William O. Jones* 441

Tractors in the Village—A Study in Turkey ..... *Richard D. Robinson* 451

Multiple-Unit Operations and Gross Labor Productivity Within the Old Cotton Belt ..... *William H. Nicholls* 463

Diversification in Resource Allocation and Minimization of Income Variability ..... *Earl O. Heady* 482

Crisis in Farm Production in Australia ..... *James P. Belshaw* 497

How Accurate Is Outlook? ..... *John D. Baker, Jr. and Don Paarlberg* 509

Some Effects of Income Tax Regulations on Farming Efficiency ..... *Raymond Beneke* 520

Comparative Productivity of Share- and Cash-Rent Systems of Tenure ..... *Louis S. Drake* 535

The Proceedings of the 1952 annual meetings is published as the December issue.

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THE AMERICAN FARM ECONOMIC ASSOCIATION

Volume XXXIV NOVEMBER, 1952 Number 4

CONTENTS *(continued)*

NOTES

Some Observations Concerning the Relationship of Consumer Research to Consumer Education ..... *J. D. Shaffer* 551

Cooperatives and Economic Welfare ..... *Leslie E. Drayton* 555

Cooperatives and Resource Allocation ..... *Conrad Gislason* 558

A Final Word on Cooperatives ..... *Arnolds P. Aizsilnieks* 563

Production Functions Derived from Farm Records—A Correction ..... *Gerhard Tintner and O. H. Brownlee* 566

PUBLICATIONS RECEIVED 567

BOOK REVIEWS

John K. Galbraith, American Capitalism—The Concept of Countervailing Power ..... *C. Clyde Mitchell* 569

C. E. Ayres, The Industrial Economy—Its Technological Basis and Institutional Destiny ..... *C. Clyde Mitchell* 569

Roland S. Vaile, E. T. Grether and Reavis Cox, Marketing in the American Economy ..... *W. E. Christian, Jr.* 572

Charles M. Hardin, The Politics of Agriculture—Soil Conservation and the Struggle for Power in Rural America ..... *Fred A. Clarenbach* 574

Mikhail V. Condoide, The Soviet Financial System: Its Development and Relations with the Western World ..... *V. P. Timoshenko* 576

United Nations, Measures for International Economic Stability ..... *Oscar Zaglits* 578

Charles S. Mangum, The Legal Status of the Tenant Farmer in the Southeast ..... *Ernest Feder* 580

H. E. Botsford, The Economics of Poultry Management ... *Edward Karpoff* 582

Glenn L. Johnson, Burley Tobacco Control Programs—Their Over-All Effect on Production and Prices, 1933-50 ..... *Willard W. Cochrane* 584

Robert W. Harrison, Levee Districts and Levee Building in Mississippi ..... *John W. White* 585

R. K. Bliss and others, The Spirit and Philosophy of Extension Work ..... *J. Paul Leagans* 588

NEWS NOTES 589

OBITUARY—William Durrett Nicholls 595

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THE NEW AGRICULTURAL ECONOMICS*

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THE social scientist is subject to a peculiar misfortune. He is repeatedly called upon to diagnose maladies of giant proportions and to recommend gargantuan cures at a time when his science is far from adequate for the task—so far, indeed, that it is not always possible to even determine that a malady exists.

Other scientists, and artists too, are frequently compelled to diagnose and prescribe out of hand, but problems brought to them are most often of a private nature and the consequences of error are confined to a much narrower circle, whereas, the problems of the social scientist frequently concern the welfare of entire states. It is difficult to dismiss unknown diseases of societies by translating a description of the symptoms into Latin or Greek, and by administering a pink pill. How much simpler if we could follow the pattern of the doctor who calls a stomach ache *gastro-enteritis* and advises resting the digestive tract with bland foods. We might then dispose of the problem of poverty in our economy by identifying it as *aporia economica* and advise abstention from consumption until the symptoms, or the patient, disappears. Lacking some such device as this, we must either confess our ignorance and fall farther in the esteem of our fellow citizens, or we must drop the guise of careful scholars and come up with some sort of policy recommendations.

Economists probably have been subjected to this ordeal more often than their fellow social scientists, and to their credit they have sometimes made correct diagnoses and prognoses. How often this has been the result of applying tested economic principles or how often it has resulted from intuition and good fortune, one would not care to guess. Usually when the economist turns policy-maker, he must rely more on his general

* Paper prepared for the Annual Meeting of the *Western Farm Economics Association*, held at Flagstaff, Arizona, July 23-25, 1952.

knowledge of the world, and on his own likes and dislikes, than on the specialized knowledge of his own discipline.

This apparent inability to appraise economic diseases and policy without appealing to some non-scientific standard external to economics has been nowhere more marked than in problems of agricultural policy. Agricultural fundamentalism, as J. S. Davis has called it,[1] has probably played a far greater part in policy-making than has objective economic analysis. And far too often agricultural economists have been guilty of special pleading both in their recommendations and in their analysis. The agricultural economists, as a group, seem to have a much greater tendency to identify the welfare of the entire society with that of one economic class than have any other group of academic economists, unless it be the Marxists.

The Schultzians

There have of course been notable exceptions. Some of the men who have tried to free agricultural economic analysis from this type of bias have been and are distinguished members of this Association. But by and large they have worked alone, and until recently, there has not been a concerted attempt to attack the alleged ailments of agriculture objectively with all the engines of economic knowledge. That such a concerted attempt is at present under way, with its principal inspiration at the University of Chicago, must by now be apparent to all of us.

Unfortunately the nature of this new approach, and the framework of the analysis on which it depends, have too often been obscured by emphasis on positive policy proposals; and it is by their proposals that T. W. Schultz and the economists who have more or less followed his leadership are best known.[2] It is not my intention, however, to devote much time to forward prices, grain-storage programs, compensatory payments, crop insurance, and measures for stimulating the movement of labor out of agriculture. These are fruits of the analysis, and in some cases the fruit seems to have been picked while still a bit immature, while in others it has been kept around until it is somewhat overripe. But this is no great matter, if the green or rotten fruit is discarded. Of much greater potential value than the present output of recommendations is the general method which is being used to produce them.

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[1] J. S. Davis, "Agricultural Fundamentalism," in *Economics, Sociology, and the Modern World: Essays in Honor of T. N. Carver,* edited by Norman Hines, Cambridge, Mass., 1935, pp. 3-22; reprinted in J. S. Davis, *On Agricultural Policy,* Stanford University, Calif., 1939, pp. 24-43.

[2] Most prominent among the "Schultzians" are D. G. Johnson, W. H. Nicholls, O. H. Brownlee, and R. Schickele, but Johnson is responsible for much of the empirical investigations on which the analysis is based. Reports of many of his studies are to be found in the pages of *This Journal* and the *Journal of Political Economy.*

The general approach of the Schultzians—or of the "Ames School" if you prefer—is a simple one. Furthermore, it is the approach which has been so successful in the natural sciences that it often goes under the name of the "scientific method." Nor is it at all unknown in economics generally, although it has not there enjoyed so great a popularity.

Basically the method is nothing more than forming hypotheses about the nature of things, and then testing each hypothesis against observations. Eventually a fairly well-established collection of hypotheses can come into being and can form an integrated core of theory that begins to explain the group of phenomena being studied.

In economics such a body of theory, based largely on personal observations, but buttressed at many points by more sophisticated statistical investigations, has been developed over the past 200 years. It is, of course, still imperfect in many respects and even its best-developed parts are still subject to revision. Economists have become expert in analysis and in making logical deductions from axioms. Indeed, one sometimes feels they have become too expert, with the result that the fascination of speculative analysis has caused them to neglect the other, equally important, part of the method—the testing of hypotheses against observations. Yet Alfred Marshall based his argument for the right of economics to call itself a science in no small part on the fact that economists ". . . deal with facts which can be observed, and quantities which can be measured and recorded; so that when differences of opinion arise with regard to them, the differences can be brought to the test of public and well-established records; and thus science obtains a solid basis on which to work."[3]

But the facts, observations, and statistics should not be expected to speak for themselves. Only when they are related to hypotheses about economic behavior and to a theoretical structure do they significantly advance our understanding.

Analysis of the "Schultzian" School

The Schultzians have used existing theory to formulate the criteria for desirable performance of the agricultural economy and to construct measures of the extent to which performance goals are realized. They have then compared actual performance statistically with performance goals. Where their measures have suggested that the agricultural economy is not behaving as well as it might, they have delved more deeply into the matter, in search of causes of failure and possible remedies.

Desirable performance is defined in terms of the efficiency with which the national product is produced and the equity with which it is distributed. Schultz represents this as a fundamental dichotomy which must be

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[3] A. Marshall, *Principles of Economics*, 8th Ed., London, 1938, p. 27.

recognized in analyzing the functioning of the agricultural economy and in setting policy goals.[4] The distinction is of course an old and familiar one to economists, but it might almost be regarded as a novelty in connection with agricultural policy. Indeed, our present agricultural legislation suggests that its framers may regard confusion of the two objectives as the guiding principle, rather than distinction between them.

In their studies of efficiency in production, the Schultzians have been concerned primarily with "technological" efficiency, that is, with that allocation of resources which will produce the greatest total output.[5] They have not much examined the efficiency of distribution of output among products.[6]

Efficiency in production is considered achieved when the marginal value product of each factor in every employment is equal to its price. Schultz further simplifies this to the negative statement:[7]

> "When the rates of return of capital, land, and labor resources are less or more than the rates of return for similar capital, land, and labor in other fields of economic endeavor, equality [in the economy of production, i.e., maximum productive efficiency] does not exist."

This is the situation described as "malallocation of resources," a favorite term with the Schultzians. This is "the resource problem."

Johnson indicates the line which investigation should take:[8]

> "What is required is a basis for determining the extent of the discrepancy between rates of returns on comparable resources employed in agriculture and in the rest of the economy, including a comparison of returns in the various agricultural regions and types of farming areas."

From comparison of rates of return, a major research task of the Schultzians, they have concluded that:

1. The marginal value product of labor is lower in agriculture than in industry, and
2. The marginal efficiency of capital is higher in agriculture than in industry.

With these "facts" established to their satisfaction, they have next turned to an examination of possible causes of the disparities in the rates of return between agriculture and industry and within agriculture. They have studied the composition of the agricultural labor force and its potential productivity in other occupations. They have examined critically the existing statistics of volume of employment in agriculture. They have

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[4] T. W. Schultz, *Production and Welfare of Agriculture*, New York, 1949, p. 13.
[5] Cf. T. Scitovsky, *Welfare and Competition*, Chicago, 1951, pp. 148 ff.
[6] See, however, D. G. Johnson, *Forward Prices for Agriculture*, University of Chicago Press, p. 24 and Schultz, *op. cit.*, Chap. XIV.
[7] Schultz, *op. cit.*, p. 12.
[8] Johnson, *op. cit.*, p. 25.

attempted to translate money income of farm and non-farm people into real terms. And they have considered relative birth rates of farm and urban families.

From their studies, they conclude that there is an excess supply of labor in agriculture which is potentially just as productive as that in industry. This excess supply arises for several reasons, but a persisting one is the greater relative fertility of farm women which causes the farm labor force to increase more rapidly than the non-farm labor force. At the same time, technological change in agriculture is reducing the man hours required for a given output and demand for farm products is increasing less rapidly than the national income. As a result, they envisage a continued need for movement of labor out of farming and into other occupations. This can best be brought about by differential wages between the two parts of the economy. That it is not being brought about with sufficient rapidity is demonstrated by the continuing differences in marginal productivity.

Now what of the relatively high marginal efficiency of capital in agriculture? The Schultzians find that this arises because of the almost universal presence of "capital rationing" in agriculture, which in turn is caused by the uncertainty of expectations. Their writings are replete with statistics illustrating the relatively greater amplitude of price fluctuations in agriculture than in industry, and occasionally they also display comparisons of income fluctuations. Uncertain expectations, coupled with relatively inflexible production plans, make farmers reluctant to invest more funds and lenders reluctant to make larger loans. The resulting undercapitalization of agriculture further reduces the marginal value product of labor.

This is the heart of the analysis which springs from examination of employment of the factors. The other welfare criterion, equity in distribution of income, has been hardly explored. There is a strong egalitarian flavor to the Schultzian notion of equity, but the standards to be used immediately are expressed merely in terms of minimums.

Two other elements must be mentioned in even this sharply abbreviated account of the Schultzian system. These have to do with the two kinds of cycles which affect farm income. The Schultzians quite properly recognize the general level of income in the economy as the principal determinant of the level of farm prices. They disavow any faith in the theory that the swings of the business cycle arise in agriculture. They look to general monetary and fiscal policy to control business fluctuations. And their contra-cyclical policy for agriculture is intended to be a part of such a general policy.

Fluctuations in supply of farm products are considered a lesser, but still important, cause of uncertain income expectations. Examination of the year-to-year changes in the production of feed grains has convinced

them that here is a significant cause of varying returns which arises on the cost side. And because of the nature of the farm enterprise, this uneven flow of feed grains reduces the efficiency of production of meat and animal products.

How Strong Is the New Edifice?

I must apologize for injustices which the preceding brief summary does to the Schutzian system. But it will serve to put before us the main lines of the analysis. This elaborate and growing structure is built of observation and theory, in approximately equal parts. Each junction of the girders of theory is bound firmly by an empirical investigation; each empirical finding is firmly tied in to the rest of the structure by one or more theoretical girders. This is surely the way to build scientific knowledge. This should indeed give us a basis for making objective and accurate policy proposals.

But can we really trust this impressive creation? Just how firm are the joints, how strong are the girders? There is only one way to find out, and that is to test it, every step of the way, empirical finding by empirical finding, and theoretical inference by theoretical inference. When a rotten timber is found it must be replaced with a sound one, when a poor joint is uncovered, it must be cut out and a search made for a better one. If this can be done, not once but over and over again, there is a good chance that we may end up with a new edifice, but it will be one we can trust to stand. There is an excellent chance, too, that much of the old structure will remain. It is hard to tell just what parts of it are sound now, until it has been examined much more carefully than it so far has been. This is a big job. It will require time and talent. Nor can it all be done by the Schultzians, any more than appraisal of the quality of construction of a house should be left entirely to the builder.

Let us suggest some of the lines this investigation should take. First we should look at the foundations. The Schutzian criterion of efficiency is written in terms of marginal value product. Now this is certainly appropriate if the economy being studied is operating under conditions of full employment. But suppose it is running along somewhat below this ideal level, as it was, of course, when many of the statistics in the Schultzian studies were being made? Is it then as important to have more efficient allocation of employed resources as it is to have a reduction in the quantity of unemployed resources? Schultz himself made a great paradox out of the conflict between these two efficiency criteria in his 1945 book when he discussed the conditions under which people have moved from farm to urban employment.

According to Schultz:

"We might expect prices to be the spark plug in this area as elsewhere in the

economy, and migration out of agriculture to accelerate as farm prices and earnings fell. But this is not what has happened. The movement of workers in and out of agriculture has been inconsistent with our economic rationale as to what people do (in the short run) in adjusting to changes in relative prices of products."[9]

It is only after belaboring this "seemingly paradoxical behavior" for some ten pages of text that Schultz gives his answer:

"Not prices, therefore, but the existence of job opportunities—the opportunity to migrate—takes farm people off farms or requires them to stay put. This suggests an important deviation from accepted thinking concerning price as a balance wheel in the economy. *The mechanism of relative prices is not effective in inducing a redistribution of the labor force; that is, in transferring the excess supply out of agriculture, unless a fuller use of resources exists than prevailed at any time from 1920 to 1944.*"[10]

If we accept the very questionable proposition that the economy was operating at such a low level of employment throughout the interwar period as to make prices ineffective in allocating resources, we may well question the use of marginal value product as the only measure of efficiency. In fact, Schultz might well have argued at this point that the supply of labor in agriculture was not excessive, if the level of employment was as low as he assumes.

Examination of the Evidence

Once we are satisfied that the foundation is reasonably sound, it would next be well to consider how firmly the entire construction is anchored to it. As we have seen, the principal tie bolts are empirical investigations of the marginal productivity of agricultural labor and of the marginal efficiency of agricultural capital.

The Schultzian analysis offers four kinds of evidence as to the marginal productivity of farm labor:

1. Comparison, between agriculture and industry, of the ratio of total output to the total number of persons in the labor force.
2. Comparison of the marginal productivity of farm and non-farm labor and capital at average output as derived from production functions of the Cobb-Douglas type.
3. Comparison of labor income in agriculture and in industry.
4. Examination of migration from rural to urban employment.

Of these four groups of evidence, the first can be discarded as in fact irrelevant.[11]

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[9] T. W. Schultz, *Agriculture in an Unstable Economy*, New York, 1945, p. 89.

[10] *Idem.* p. 101. Italics in the original text. The misplaced semi-colon in this statement tends to produce a distortion in meaning. Presumably a comma was intended.

[11] It may be of interest to know that, in 1950, total farm output averaged $2,640 per full-time worker, while in all manufacturing the comparable figure was $4,950.

Marginal costs derived from statistical production functions appear to be more impressive evidence. But even if debate over the precise meaning of the Cobb-Douglas functions is ignored, existing studies are disappointing. Let us look at some of them.

Johnson fitted a linear equation to the logarithms of average value added, value of land and buildings, and man years of labor of nine output groups in four census subdivisions.[12] From the production function fitted to these 36 observations, he concluded that the marginal productivity of labor was $390 per man year. But identification of land and buildings with capital, and failure to take into account other inputs, must shake our confidence in his findings.

Two other studies cited by Schultz are not more useful. Heady, using a random sample of 738 Iowa farms, computed production functions for 12 different subgroups and for all farms in the sample.[13] Labor inputs were reported in man months. In not one of the 13 multiple regressions did he find significant correlation between labor inputs and total output. Inasmuch as labor must certainly have some effect on output, one can only conclude that either the labor input data was defective or that it was highly correlated with other inputs. This amounts to excluding labor from the production function, and must make suspect the coefficients of all other inputs. A similar study by Tintner and Brownlee of 468 record-keeping farms in Iowa seems to show marginal productivity of labor to be about equal to the average farm wage, but the sample on which the study is based was not random even for Iowa.[14]

Comparison of wages paid for comparable jobs in and out of agriculture might be a clue as to the marginal productivity of labor in the two employments if we could adjust for the differences in purchasing power and for differing non-monetary rewards in the country and in the city. The usual comparison, however, has been between people rather than jobs. (And this raises the question of relative inherent productivity of individuals.) Labor's average money income seems unquestionably to be lower in agriculture than in industry, although the amount by which

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It is also interesting to know that output per worker in the petroleum and coal-products industry was $14,700, while in the automobile and automobile-equipment industry it was $8,200, but few would therefore advocate moving labor out of the automobile industry and into the petroleum-products industry.

[12] Johnson, *op. cit.*, pp. 105, 106. See also D. G. Johnson, "Contributions of Price Policy to the Income and Resource Problems in Agriculture," *This Journal*, November, 1944, pp. 651-653.

[13] E. O. Heady, "Production Functions from a Random Sample of Farms," *This Journal*, November, 1946, pp. 989-1004.

[14] G. Tintner and O. H. Brownlee, "Production Functions Derived from Farm Records," *This Journal*, August, 1944, pp. 566-71. Even in this study, the regression coefficients may not be free from distortion arising from correlation among the "independent" variables.

it is lower cannot be determined accurately. Real income presents much more difficult problems, and we are not able to make any firm statements about it despite some excellent preliminary studies.[15]

Estimates of income going to the factors employed in agriculture are apt to be inaccurate because of the difficulty of estimating costs and revenues for so large a number of firms, many of which keep only casual records, and because most farmers are at the same time landowners, capitalists, laborers, and entrepreneurs. Furthermore, many farmers could not obtain comparable employment as managers or even as farm hands if they were not able to furnish some of the capital and to assume the risks of business operation. Until greatly-improved estimates can be made of the returns to the factors in agriculture, and these in real terms, and until labor income can be related to the kinds of jobs done, rather than to the people doing them, comparisons of farm and nonfarm wages will be on uncertain ground.

The fourth kind of evidence on productivity of labor, migration from farm to urban residence, is of quite a different character. Statistics showing place of residence are better than statistics of income.[16] There has undoubtedly been a continuing net movement of people from farm to urban residences. But the very magnitude of the migration away from farms, and onto farms, must be evidence of the high mobility of the farm labor force. It is just the behavior which would be expected in a dynamic economy, and may be taken as evidence that the equilibrating forces are operating efficiently. It does not necessarily indicate great disparities in labor productivity.[17]

We are left with no very firm grounds on which to appraise the efficiency of employment in agriculture. There may very well be a surplus of labor in agriculture, the marginal productivity of farm labor may be too low, but so far the statistical evidence is not entirely convincing. It is to be hoped that Schultz and his circle will continue to seek sounder measures of labor productivity. It is also hoped that others outside this circle, will join in this work and will test the results so far published.

When we turn our attention to the marginal efficiency of capital, similar difficulties are encountered. Johnson's estimate of the marginal productivity of capital in agriculture, 12 per cent, is little more than a calcula-

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[15] See for example articles by N. Koffsky, E. W. Grove, and Margaret Reid, in National Bureau of Economic Research, *Studies in Income and Wealth*, XI, New York, 1949.

[16] The recent 10 per cent reduction in the estimate of farm population suggests that even these figures are not precise.

[17] J. S. Davis, "American Agriculture: Schultz' Analysis and Policy Proposals," *Review of Economic Statistics*, May, 1947, p. 83. See also C. Kaysen and J. H. Lorie, "A Note on Professor Schultz's Analysis of the Long Run Agricultural Problem," *Review of Economics and Statistics*, November, 1948, pp. 287-288.

tion of the average rate of return to land and buildings in one year at current estimates of value of real estate. It is probably an overestimate if, as appears from published information, it takes no account of other capital inputs. It certainly is not marginal efficiency of capital, because it takes no account of expectations.

The argument having to do with capital rationing—uneconomically sparing application of capital—is similarly incomplete. The phenomenon described is undoubtedly present in agriculture, even if one is inclined to take exception to the term. But it is also present in most other economic activities. Non-farm business men have uncertain expectations, too, and often fail to make investments which would have proved profitable. Non-farm business men try to hold down borrowed capital to a level which will not jeopardize their own control of the firm; and non-farm lending agencies limit the amount of credit they will supply to one firm. The question is not whether the supply of capital limits the farm firm's efficiency, but whether it limits farms more than it limits other firms.

Summary

The foregoing is enough to suggest the need for further empirical testing of the Schultzian structure. It by no means treats all the points where testing is necessary. The degree of variability of farm income, the flexibility of the farm enterprise, the relation between farm and urban birth rates, the potential productivity of farm laborers, the elasticity of demand for farm products—all these are matters on which much more research is needed.

The Schultzian approach to agricultural policy provides us with scaffolding from which to construct a better understanding of the agricultural economy. Building equally with theory and with empirical observations, it makes possible the appeal to "public and well-established records"—without which science cannot obtain "a solid basis on which to work." What is lacking now is more workers to test the facts and examine the interpretations of these facts. If other agricultural economists will take a similar approach to policy problems, we may look forward to a day when at least some facts will be accepted as established, some relationships as valid, and when we may be free from the endless churning around and around of arguments with no conclusion. There might even come a day when an economist can make policy recommendations and still remain an economist.

TRACTORS IN THE VILLAGE—A STUDY IN TURKEY

RICHARD D. ROBINSON[1]

THE sudden and mass influx of farm machinery into a semi-primitive village society creates pressing social-economic problems.

A natural laboratory in which to analyze such matters is Turkey's Deep South—The Chukurova, an alluvial plain thrust out by the Seyhan and Jeyhan Rivers from Turkey's mountainous underbelly. Comprising the better part of Seyhan and Ichel Provinces (approximately 3,100 square miles), the plain is fronted by the Mediterranean and backed by the Taurus Mountains. Hub of this lush coastal region is Adana, a noisy, boom town of some 120,000 persons.

The Chukurova thrives on cotton. It was to increase the production of this foreign exchange-yielding crop that the Marshall Plan turned the Chukurova into the most heavily mechanized area of comparable size in Turkey, perhaps of the Middle East. Of the 6,500 tractors imported into the country since 1948 under ECA auspices, between 1,200 and 1,500 have found their way to the Chukurova.[2] Latest tally indicates that 3,720 machines are now at work on Chukurova farms. This total represents a 460 per cent increase over the 1948-1952 period.[3]

It was to find out what had happened to the people amidst whom these machines were thrust that the author recently surveyed a group of Chukurova villages.[4] Being well on the way toward highly mechanized farming, such communities possibly give a clue to the Turkey of the

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[1] Richard D. Robinson is a staff member of the Institute of Current World Affairs, foreign observor for the American Universities Field Staff, and representative of the Chicago Daily News Foreign Service. For the three-year period, 1948-1950, he resided in Turkey studying and reporting on contemporary Turkish life and affairs. In 1950 he served as Area Specialist and Research Assistant with the Economic Survey Mission sent to Turkey by the International Bank for Reconstruction and Development. In November, 1951, he returned to Turkey for an additional two to three years of observation and reporting.

[2] Of the $305.5 million ECA aid received by Turkey to date, $42.3 million—nearly 15 per cent—has gone into agricultural equipment, largely tractors and tractor-drawn implements. This sum represents the largest single item in the Turkish ECA (now MSA) program.

[3] 1952 total is based on estimates supplied the author by the Directors of Agriculture for Seyhan and Ichel Provinces. The 1948 figure is taken from a special report prepared by the Turkish Ministry of Agriculture, 1950.

[4] For purposes of this survey, 15 villages were selected at random across the Plain. Among them, six were Turkish, six Yürük (Türkmen), and three Kurdish or mixed. Some of the settlements were poor, others wealthy; some were of recent origin, others ancient; some had many tractors, two none. To check the findings of the author, the aid of 18 Tarsus American College boys—all Turks—were enlisted. They revisited 10 of the 15 villages, going over the same ground that the author had previously covered. In this manner, all data was checked by independent observers.

future, for there seems little doubt now that tractors have come to stay on Turkish farms and that they will chew up more and more of the ex-cultivated fields of the Turkish peasant-villager.

I. Economic Setting

In considering the social-economic impact of this new farm machinery in the Chukurova, one should keep in mind a number of facts. One is that since the beginning of the recent rapid farm mechanization three or four years ago, the amount of new land broken in the Chukurova has been relatively small. The expansion of cotton acreage has, for instance, come about largely at the expense of cereal production.[5]

A second fact is that practically all government-owned farm land has been distributed to the villagers.[6] The last state land is being used to settle over a thousand Bulgarian refugee families. The disappearance of such state land means that the present pattern of land tenure cannot be altered by further distribution of land to the landless or near-landless.

A third fact is that the increased price of cotton in recent years, plus higher per-acre yields, has upped income per-unit of land by as much as 100 per cent or more. This increased return also has advanced the value of land in relation to labor, thereby making it doubly difficult for the ordinary small village-operator to augment his current property holdings. The market price of good cotton land is quoted between 300 and 400 Turkish lira per *dönüm* (roughly $425 to $575 an acre). Responsible officials report that little farm land is now changing hands through sale—though certain notable exceptions were found during this survey.

A fourth point: despite swollen incomes, no tax is paid on any income derived from soil products, cotton included. Even the very wealthiest landlords pay only negligible land and building taxes. In the absence of a progressive income tax covering farmers, the diffusion of new wealth is slower and narrower than might otherwise be the case.

Another important factor is that the density of Chukurova's population is well above the national average of 24 persons per square kilometer.

And finally, of course, the expansion of farm mechanization has been rapid—a 460 per cent increase in the number of tractors since 1948. Thus, any problems inherent in the mechanization process tend to be aggravated.

In several respects then, the situation which has unfolded in the

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[5] Statement is based on testimony of agricultural officials in the Chukurova, official statistics, and village interviews.

[6] There are now 55 Land Commissions at work in Turkey distributing state-owned lands to land-starved farmers. Thus far, in seven years of work, 35,276 families have received a total of 422,792 acres. Payment is in 20 equal annual installments beginning with the seventh year of ownership. Average price runs about $14 an acre.

Chukurova is not *now* typical of Turkish agriculture. But it might well become so in the not-too-distant future and in that respect should constitute a warning to all concerned. In the Central Anatolian dry grain farming region—as typically Turkish as is any in terms of farm technique and development—both population and tractor density are much less, and the distribution of state land at nominal fees to land-poor peasants still proceeds.[7] There, tractors apparently have meant an absolute increase in land under cultivation, though unrestrained plowing up of pasture land by tractor-wielding farmers has made a large number of villagers who live by animal husbandry something more than unhappy. Inasmuch as this herdsman-farmer friction may indicate the end of the shift of pasture land which *should* be put under the plow, it is perhaps a reflection of yet another facet of the situation which has arisen in the Chukurova.

II. Patterns of Impact

It was found at the very outset of this survey that the impact of machines upon the village community varies greatly depending upon the historical development of the community, its economic structure, and its location. It is possible that still another factor—village social structure—also bears significant import. The Chukurova villages of Agzikara and Mihmandar provide opposite extremes for consideration of the first two of these three, or possibly four, interrelated factors.

Agzikara

Agzikara is a community of about 250 houses (perhaps 1,000 people) lying not far from the foothills of the Taurus. Villagers say that it was founded about 1900 and that prior to that time the site had been inhabited by Armenians who had "sold out." The present inhabitants are Yürüks, a nomadic people of Türkmen stock who used to—and many still—move seasonally with their flocks between the Taurus Mountains and the Mediterranean coast. For several decades now an increasing number of these folks have been settling down in villages in the Chukurova. Being among the newest residents, the Yürüks have tended to concentrate along the periphery of the plain, either in the foothills of the Taurus or along the coast.

There are 24 tractors in this community, and they all are owned in the village. Evidence of prosperity was not difficult to find. New and improved houses of a type quite different from the traditional village mud-hut shelter were numerous. Last year the village added a minaret to the mosque.

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[7] For a description of land problems in the whole of Turkey see W. H. Pine, "Some Land Problems in Turkey," *This Journal*, May, 1952, pp. 263-267.

Village lands total an estimated 3,000 to 4,000 acres, all of which are village-owned. The most important crop is cotton. Only 12 or 15 families are said to have little or no land. About the same number, in addition to working their own fields, share-crop land owned by others. The one-in-three system of sharecropping has replaced the half-and-half system, thereby reducing the cropper's return from one-half to one-third of the crop. Villagers insist, nonetheless, that most households are kept busy on their own land, hiring day labor to help in the weeding and picking and that no one seeks work elsewhere. They claimed that at the height of the cotton season as many as 1,500 workers come in from the "outside".

It seems likely that the benefits derived from mechanized farming have been diffused widely enough within this community to have an appreciable effect upon the general standard of living. Why? First, the village is relatively new. It started out with a substantial amount of land, probably held in fairly equal plots by village households, and there has not yet been time for the holdings to have been fragmented via the usual form of inheritance (i.e., one-quarter to the surviving widow and the balance divided equally among all children). Thus a substantial number of Agzikara village households possess enough land to put up as security to finance the purchase of a tractor. With a tractor one can share-crop or custom-plow additional land. All village lands being owned by village-dwelling landlords, wealth tends to remain in the village.

Mihmandar

The other extreme is presented in the case of Mihmandar, a community of possibly 120 houses and probably 600 persons. The village is so old that no one even hazarded a guess as to its age. Mihmandar is located close to Adana on a main road. Village boundaries enclose an estimated 3,000 to 4,000 acres, almost all of which is owned by 11 city-dwelling landlords. Only this year some 175 additional acres were sold by villagers to the landlords to settle debts.

Mihmandar, lying in a relatively densely-populated area, is pressed on all sides by other villages. Extension of cultivation has long since ceased. Equal division of fields among heirs no doubt went on for many generations until the villagers became so impoverished that the trend reversed, and a few city-dwellers (or possibly more fortunate village families which later became city-dwelling) bought the land, amalgamated it, and let it out on a share-cropping basis. The process would appear to be still going on—witness the recent sale of land. Then came the tractors; there are 14 now, all owned by the city-dwelling landlords. Sharecropping now is giving way to a system of hired labor at a daily stipend of two to three lira ($.71 to $1.07). Little wonder that one of the villagers drew his finger across his throat, saying, "The Marshall Plan is doing this to us."

It is suggested that the general process by which a village loses its land is something like this. While a village is new, a household is limited in the land it can cultivate only by the animal and manpower at its disposal. Slowly, the area of cultivation is pushed out to the village boundaries, a line determined by struggle and negotiation with neighboring villages and/or natural barriers (including distance from the village). The impact of inheritance then begins to pinch as fields are divided, subdivided and redivided among the heirs, a process which ultimately leads to fragmentation of holdings.

As villagers find it more and more difficult to live off the proceeds from their small plots, there develops a tendency to sell out in time of crisis (e.g., crop failure, sickness, debt, and the like) to those who can afford to buy. The latter, some of whom grow in landed wealth either through accident (small families) or shrewd living, tend to gravitate toward the easier life enjoyed by the rich in the cities. Share-cropping and seasonal labor then become the pattern. It would seem that these city-dwelling landowners are much less inclined to divide their land equally among their heirs. Frequently, one member of such families buys out all others or the land is farmed cooperatively.

The location of a village in relationship to resources or markets may make it possible for the residents to indulge in alternative occupations and gain back income diverted from their pockets by the labor-saving tractor. In Mihmandar, which lies astride a main road, a number of small roadside business establishments have sprung up, though the village is now so impoverished that these probably do not make up more than a small percentage of the lost income. In another village it was found that a substantial number of people had turned to charcoal and lime production. Coffee houses and small shops are appearing in a large number of communities, but these present only limited alternatives.

Most of the villages in the Chukurova seem to be old and thus suffering either from land fragmentation or city-ownership. Further, most seem to possess no resources other than the land and are located off a main road. Thus, they lack *obvious* opportunity for alternative income. It is not surprising that of the 15 villages studied, the general reaction in only five seemed favorable to the ECA-financed tractor program; five others adopted a neutral attitude; the remaining five showed hostility.

Social Organization

It was suggested earlier that social organization may in part determine community reaction to tractors. If the village consists, for instance, of a single main family core or *kabile*,[8] it would appear likely that there is a

[8] The Turkish term *kabile* is defined as the members of those households whose heads claim common patrilineal descent up to a depth possibly of four or five genera-

greater diffusion of economic benefits derived from farm mechanization, even though a substantial number of families might own little or no land. An effective social security system may operate in such cases to cushion the shock, the wealthier of a given *kabile* exercising certain economic responsibilities towards its more unfortunate members. As a village develops a multiple *kabile* structure, it may be that antagonisms arise which split village solidarity and, if landed wealth were concentrated in one *kabile,* the others might well suffer as labor requirements are decreased through mechanization. This statement is theoretical, for during this brief survey it was not possible to gather convincing evidence one way or the other. On the face of it, however, the thesis sounds highly plausible.

For these reasons, one can hypothesize that the general impact of mechanized farming upon the Turkish village community is largely determined by the historical development of that community, its economic basis, geographical position, and social structure.

III. Tractors and Change

Exceptions must be made to any generalization one might make by reason of these varying village situations. It is believed, however, that mechanization of agriculture in the Chukurova has led to four basic changes in village life. Specifically, these are: alteration of the land tenure system, a decrease in the amount of labor required in the villages, a cutback in total village income, and a weakening of village morale.

Land Tenure

There is little doubt that the tractor and increased per-acre income have been responsible for a shift in land tenure arrangements. Traditionally, the half-and-half system prevailed in which cropper and owner shared certain costs of production, after which the crop was split 50-50. In no village was such a system found still operating. In what little half-and-half as remains, the owner provides only the land. More common now is one-in-three. In this system, as currently practiced, the owner provides the land and plows and seeds the fields. The cropper pays all expenses incurred in weeding and picking and is rewarded by one-third of the crop, less seed. Sometimes a one-in-four system is found, which is much the same except that one-quarter of the harvest goes to the cropper and the seed is supplied by the owner. In many villages no share-cropping remains in any form; everything is done by hired day labor.

These innovations stem from a two-fold cause—first, heavier cotton yields and increased cotton prices (making possible greater return from

tions. The concept of *kabile* is well developed in Paul Stirling's *Social Structure of Turkish Village Communities,* a dissertation submitted for the degree of Doctor of Philosophy, University of Oxford, June, 1951, p. 35.

a given plot of ground) and second, mechanization. The first provides incentive for the owner to cut back the percentage of the crop taken by the share-cropper, thus maintaining the cropper's income but increasing his own. The tractors, on the other hand, make it practical for the owner to dispense with share-cropping altogether. There is no longer any need for him to support a number of share-croppers and their oxen when all he requires is a small amount of temporary labor to drive the machines at the right season. The productivity of such labor is great enough so that the owners can pay a living wage and still realize larger profits than if their fields were let out on a sharecropping basis.

Landowners and tractor-drivers both prosper; the ex-sharecroppers (who by their very position in life probably cannot finance the purchase of a tractor) find themselves employed only as seasonal labor to weed and pick, the two jobs not yet mechanized. Productivity in such unskilled, non-mechanized work being low, labor so employed on a seasonal basis (perhaps three or four months a year) earns little in the fields and must seek employment elsewhere during the off seasons. It is probably safe to predict that, given increasing mechanization, such day labor will continue to gain over all forms of sharecropping.

Village Labor

One of the immediate impacts of the tractor is to reduce the labor requirement in the village. But this reduction strikes the various communities differently. Where considerable village-owned land is available and held in large plots by a substantial number of households, some members of nearly all families may be employed on the land despite mechanization. Therefore, most village households may gain as much income—if not more—than before the coming of tractors. Agzikara would appear to be such a case. Though individual village households may be prospering, the amount of unemployment (or more correctly, underemployment) may be increasing rapidly for the village as a whole by reason of the machines. That is, income might increase slightly via a decrease in costs and better and more timely cultivation, but unless labor so released is used in other productive enterprise, there is but little gain in over-all productively. This would not be true were there open land in these villages upon which to expand cultivation, but such is not the case.

If, on the other hand, village lands are owned by a very few households, a large number of village families may become almost completely idle, thereby suffering considerable reduction in income. In brief, the new machine-enforced idleness is mal-distributed. If one speaks of the village as a unit, it may be that no more unemployment and/or underemployment exists than in the former case. Mihmandar village seems to be of this type. Here, greater income is being channelled to a few house-

holds by reason of the termination of sharecropping, and many families can find no employment within the village at all. Temporarily they seek work on the "outside".

Mechanization has decreased farm labor requirements during late fall, winter, and early spring months. But, by making possible expansion of cotton acreage and increase of yields, the new machines have lifted the number of field hands needed during the harvest.

Change in labor requirement wrought by the tractors has been in the direction of vastly increasing underemployment, drastically curbing winter migrant labor needs, and significantly stepping up summer employment. Greater underemployment and seasonality of labor have emerged.

One might think that the lowered labor requirement in the villages would induce people to move into the city. However, there is little evidence that such is happening. To a number of villagers who complained most bitterly of what the tractors were doing, the query was addressed, "Why don't you move into the city?"

"We have a house here", they answered; "in the city we would not. We have no money to move. In the village at least we can live."

As a result of the new cotton wealth, there is probably an increasing demand in town and city for goods and services. But the ordinary villager with a small plot of land is in no position to satisfy this demand for the simple reason that he lacks capital and training. Moreover, once he leaves the village he can secure no credit from the Agricultural Bank or any other agency. He could sell out his small holdings in the village to finance a move to the city, but this desperate plunge is one that few are willing to take.

There is still another aspect of the farm labor problem often overlooked. By releasing labor from the fields, the machines may make it possible for village women to devote more time to home and children. Tractors may, in fact, effect an eventual change in status of women within rural Turkish society. On the subject of child care and tractors, one rural health official working outside Ankara made this point: "Machinery was tried out in a couple of villages last year. The infant mortality rate dropped in those villages because the mothers had time to look after their babies during the harvest season."[9] Inasmuch as one of the prime problems in the village is surplus population, perhaps this argument is not overly convincing.

Village Income

Although total land under cultivation is not increasing in the Chukurova, the value of crop per unit of land is. This tendency should mean

[9] Interview with Dr. Cemalettin Or, Director of Etimesgut Rural Health Center, 40 kilometers southwest of Ankara, January 10, 1950.

greater village income. But, as already indicated, there is a tendency for older forms of sharecropping to disappear in favor of day labor so that the income of the chap actually working in the field tends to remain constant. That is, as the value of the crop increases, the share remaining with the sharecropper decreases to a point where he no longer has a share at all but a wage of only a few liras a day for perhaps three or four months out of the year. Furthermore, as the system of land tenure changes, an increasingly greater share of the total income from agriculture goes directly into the city. It is the rich, not the poor, who are moving out of the villages. Income is being channelled away from the villages as a result of mechanization. Despite an increase in city demand for goods and services, the villager is in no position to satisfy it.

Do the wealthy invest their wealth in the villages in which they own land? The answer, it seems, is "no" when it comes to financing productive enterprise. Occasionally, one may finance a new minaret for the village mosque or help in improving the village road, rarely more.

Village Morale

Apart from such economic impacts on village life, tractors seem to have altered the mental attitude of villagers. In the Chukurova, one senses resentment against landlord and city-dweller not common elsewhere in Turkey. Further, the emotional bond linking the peasant with his land is being broken as more and more are forced to day labor. A sense of insecurity seems to be penetrating these villages, for a number of persons now claim that they would move into urban areas if they felt any hope of prospering there.

The Chukurova village too is probably becoming increasingly susceptible to change. Tractors have made the village change-conscious, as well as machine-conscious. New village homes with their well-tailored construction, glass windows, and corrugated steel roofs are a radical departure from the traditional. Radios are now much in evidence, likewise village coffee shops. Both represent innovations in Turkish rural life. Village society probably is becoming more urban. Specialization in a cash cotton crop makes the village increasingly dependent upon the city, as does the use of tractors. Furthermore, the tractors are being used to carry wagon-loads of villagers into town with increasing frequency, and the number of villagers working temporarily outside their respective communities is growing.

It should be added that this developing consciousness of change, expanding sense of insecurity, and growing restlessness and mobility have not yet taken on any appreciable political undertone. There is no indication that the villager links these many problems with the fortunes of any particular political group or ideology.

IV. What May Happen

The problems created in the Chukurova by the flood of farm machinery is fundamentally one of surplus village population. This is possibly true throughout Turkey, but in the Chukurova the speed with which mechanization has come about has vastly aggravated the matter. There is nothing to indicate any appreciable rural-urban shift in population, despite the machines. In the absence of new land to break, something is one day bound to give way under the pressure—given the absence of any realistic planning and development.

A well-integrated program to deal with this problem would possibly include:

(1) Development of cheap power
(2) Encouragement of new industry
(3) Construction of cheap housing in the cities
(4) Subsidization and training of village families moving into urban areas.

The cheap power seems to be on the way. Financing for the construction of a multi-purpose dam on the Seyhan River above Adana has been found. Apart from an important flood control function, the structure will provide irrigation for some 400,000 acres and produce 60 million kilowatts of electric power.

Village Industry

Abundant cheap power would make possible new industry and perhaps even rural electrification. The latter might, in turn, make feasible village industy. It has been suggested that small dispersed industrial plants in village areas might be a solution for the underemployment, a solution which would at the same time maintain the stable village social organization. The idea of a dispersed factory is alien to most American concepts of factory organization and management, but such an organization would:

(1) Act to maintain the social stability of Turkish society by preserving many of the essential ingredients of village community life, thereby minimizing class conflict
(2) Serve as a means for the dispersion of scientific education (via demonstration) where it is most needed
(3) Increase per-capita productivity of the village population
(4) Possibly provide a readily-accessible market for certain farm products of the region
(5) Minimize destruction in case of war.

Uneconomic factors inherent in such organization might be overcome in part at least by a stabilized, experienced labor force, as well as by military defense considerations.

Class conflict and social unrest can be minimized by utilizing the same individuals in both agriculture and industry. Growing underemployment and seasonality of labor in the Chukurova make the latter possible. This dual use of individuals in field and factory acts to protect them against undue exploitation, for if the village-located factory unit were to take unfair advantage of the villager, the latter could turn back to the land. The economic bargaining position of the villager-farmer-worker would appear much stronger than that of the city laborer.

This rural industrialization process might halt another seemingly disastrous trend, the fragmentation of land holdings via inheritance. As already pointed out, the custom is for land holdings to be divided so that one-fourth goes to the surviving widow and the balance in equal shares to all children. Very few villagers make wills which run counter to this system, although such wills are quite legal. Top agricultural officials in the Chukurova are concerned about this problem from the point of view of developing modern agriculture. They speak vaguely of changing the law to enforce a system of primogeniture, but quickly admit that custom and religious sanction would make such a legal change extremely awkward, if not impossible, to enforce. But, if in the villages there were substantial alternative sources of income—such as rural industry—it might well be that the villagers themselves would begin to change the pattern of inheritance, as have a number of the large city-dwelling landlords.

Migration

It probably will be necessary to move a substantial number of people out of the villages, even given rural industry on a cheap-power basis. In 1950 the percentage of people in the Chukurova living in the village approximated 80 per cent of the total population of the area. This percentage must, in the near future, be cut if village standard of living is to be maintained or improved. Such a cut calls for cheap housing in the cities, new industry, training facilities, and the temporary subsidization of village families which move into urban areas. This is necessary if Turkey wishes to circumvent the stresses and strains which were experienced by Western nations when the mass rural-urban move began to get under way.

Summary

The foregoing has been phrased in terms indicating what might be done by the powers-that-be. One might hazard the prediction that even in the absence of any well-laid plans there may emerge in the Chukurova—and perhaps eventually throughout Turkey—a new type of industrialized village society. Mechanization has come so fast that no large-scale rural-urban movement has had a chance to form. Villagers cling tenaciously to their old habitats and customs. If, before they are forced out, cheap

power makes possible small-scale industry in the village, the peasants may jump at the opportunity of preserving their social structure. With the whole process of mechanization-industrialization shoved into high gear, social customs and attitudes are not given opportunity to change apace. That which emerges may well be some new form of society, and the industrialized village seems most likely.

MULTIPLE-UNIT OPERATIONS AND GROSS LABOR PRODUCTIVITY WITHIN THE OLD COTTON BELT

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"The infinity which moves us is the sense of multiplicity in uniformity."
—SANTAYANA

I. *Objectives and Limitations*

THE Census concept of a "farm" is peculiarly inappropriate for an analysis of the structure and organization of the agriculture of the Cotton South. The Census commonly designates and reports single units and the sub-units of multiple-unit operations alike as "farms," making it impossible to distinguish between them or to determine the characteristics of the larger management units of which the sub-units are a part. As a result, the nature of a system of plantation agriculture, prevalent throughout the Old Cotton Belt, is almost wholly obscured.

Some definitions will make the importance of these observations clearer. A *multiple-unit* farming operation consists of two or more *sub-units* handled as a single farming enterprise. One of these sub-units is usually the *home farm*, handled by the multiple-unit operator with the help of family or hired labor. The home farm contains the home of the multiple-unit operator or the headquarters where workstock and equipment are kept for the entire operation. The *other sub-units* usually are operated by share-croppers under the supervision of the multiple-unit operator, who maintains central control over sale of products, workstock, machinery, and equipment; crop rotation; and purchase of supplies. The home farm includes all land associated with the over-all operation which is not assigned to these other sub-units. It is important to note that, from the standpoint of farm organization and management, the several operating sub-units are a single *management unit*. In addition to such multiple units, the South, as elsewhere, has many *single units*, each operated as a complete farm business by the operator, his family, or hired workers. A single unit is both an operating and a management unit.

It is obvious that—because of these important differences in their organization and management—home-farm sub-units, other sub-units, and

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single units (all of them Census "farms") may have distinctive characteristics of their own. But, until the publication of a special report of the 1945 Census of Agriculture,[1] it was impossible to determine the nature of these characteristics. In the present article, this report will be used as the basis for making two important types of comparisons. First, we shall compare certain important characteristics of single units, home-farm sub-units, and other sub-units within the same type-of-farming sub-region. Second, we shall examine separately, for each type of operations, significant differences in these characteristics among 13 type-of-farming sub-regions of the Old Cotton Belt. In these comparisons, attention shall be centered upon differences in the gross value of product, per farm and per worker; and their relations to differences in capital and land inputs.[2] In doing so, three major hypotheses will be utilized.

(1) *The first hypothesis is that, within the same type-of-farming sub-region, productivity per worker is higher on the average multiple-unit operation than on the average single-unit operation.* This would follow if the multiple-unit operator can provide his labor force with superior management, more and better land, more advanced technology, and more non-real estate assets than can the single-unit operator. Certainly, one would expect the multiple-unit operator to face less severe problems of external (and probably internal) capital rationing—particularly for acquiring non-real estate assets—while having fuller access to the best production and marketing information. On the other hand, in 1944 (the year under study here), the technology (hence factor and product combinations and scales of operation) was probably similar on sub-units, possibly apart from home-farm sub-units, and single units. As a result, differences in human productivity between types of operating units were probably more the result of differences in the quality of land and management than of basic differences in farm organization. Hence, our comparisons between single and multiple units are perhaps more significant for the future than for even the recent past.

(2) *The second hypothesis is that, on either single or multiple units, there are considerable differences in the productivity per worker among the several type-of-farming sub-regions of the Old Cotton Belt.* As Table 1 and Figure 1 indicate, the 13 sub-regions are delineated primarily according to differences in physical rather than economic conditions. Hence,

[1] U. S. Bureau of the Census, Census of Agriculture 1945, *Special Report on Multiple-Unit Operations in Selected Areas of Southern States,* Washington, 1947.

[2] Space does not permit the presentation of comparisons of other important characteristics—such as crop-livestock combinations; industrial-urban development, changes in population, and off-farm employment; and cash wages, hired labor, and unpaid family labor—among types of operations and type-of-farming sub-regions. However, these data are available in a mimeographed supplement which the writer will be glad to send to any reader upon request.

TABLE 1. TYPE-OF-FARMING SUB-REGIONS OF THE PRESENT STUDY IDENTIFIED BY STATE AND GENERALIZED TYPE-OF-FARMING AREAS INCLUDED IN EACH, AND AVERAGE YIELDS (POUNDS) OF COTTON PER ACRE (1944)

Type-of-Farming Sub-region[a]	State Type-of-Farming Areas Included[b]	Generalized Type-of-Farming Area[c]	Av. Yield Cotton per Acre[m]
1. Upper Tidewater[d]	Va. VII; N.C. III	Peanuts and General Farming	529
2. Flue-Cured Tobacco[e]	N.C. IV N.C. V, V-a	Tobacco and General Farming Cotton and Tobacco	497
3. South Carolina Sandhills[f]	S.C. II	Specialized Cotton	398
4. Upper Coastal Plain	S.C. III-a, III-b; Ga. V, VIII; Ala. V	Specialized Cotton	376
5. Lower Coastal Plain[g]	Ga. IX	Cotton, Tobacco, Hogs, and Peanuts	309
	Ga. VI, VII; Ala. VIII	Peanuts and General Farming	
6. Southern Piedmont	N.C. V-b; S.C. I; Ga. III, IV; Ala. IV	Specialized Cotton	358
7. Limestone Valley[h]	Ga. I; Ala. I, III	Cotton and General Farming	373
8. Black Belt	Ala. VI, Miss. IV	Cotton and Livestock	327
9. Clay Hills[h]	Miss. III	Specialized Cotton	369
10. Gulf Pinewoods[i]	Miss. V	Cotton and Forest Products	383
11. Brown Loam[h]	Miss. II-a, II-b; La. VI	Cotton and Livestock	356
12. Delta[j]	Miss. I; Ark. VIII; La. III, VII La. VIII	Specialized Cotton Cotton and Sugar Cane	442
13. West Sandy Coastal Plain[k]	Ark. VI; La. I, II	Cotton and General Farming	224

[a] Separate cotton production areas recognized by Bureau of Agricultural Economics. Numbers correspond to those of the subregions delineated in Fig. 1.

[b] These areas are delineated by number on the state maps in *Multiple-Unit Operations* (op. cit.), which summarizes all data separately for each area.

[c] U.S.D.A., *Generalized Types of Farming in U.S.*, Agricultural Information Bulletin No. 3, 1950, pp. 31–34.

[d] Northern Coastal Plains, Virginia-North Carolina.

[e] Central Coastal Plains, North Carolina.

[f] Sometimes included in Upper Coastal Plains.

[g] Combines Lower Coastal Plains of Georgia (Ga. IX) with Southern Coastal Plains, Georgia and Alabama.

[h] Parts of Tennessee omitted.

[i] Mississippi VI omitted because data combined with Mississippi VII in *Multiple-Unit Operations* (op. cit.)

[j] Deltas of Mississippi and tributaries, omitting parts of Tennessee and Missouri, plus Central Louisiana (La. VIII).

[k] Parts of Texas and Oklahoma omitted.

[m] Computed from Type-of-Farming Area Table II, *Multiple-Unit Operations*.

this hypothesis expresses the belief that, presumably because of serious imperfections in the various factor markets, short-run geographical differences in human productivity are partly associated with differences in physical conditions—particularly soil, climate, and topography. This does not mean an acceptance of the crude theory that land and other natural resources which are "poor" in some physical sense necessarily result in poor farmers. Rather, it is recognized that, in the long run, the supply of land and capital to the individual farmer may be relatively elastic. Under

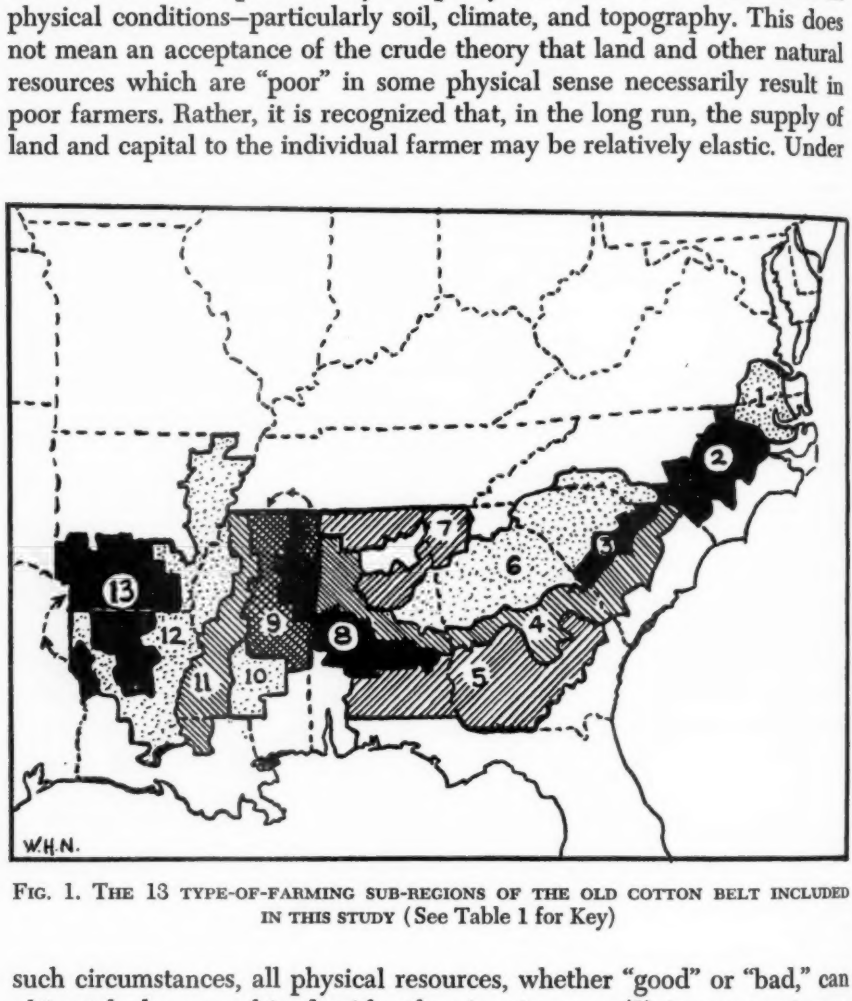

FIG. 1. THE 13 TYPE-OF-FARMING SUB-REGIONS OF THE OLD COTTON BELT INCLUDED IN THIS STUDY (See Table 1 for Key)

such circumstances, all physical resources, whether "good" or "bad," can ultimately be recombined with other inputs so as (1) to even out geographical differences in the productivity of the human agent and (2) to do so at a higher common level which is on a par with productivity (hence income) per worker in comparable non-agricultural employment.

In general, however, most parts of the South have not achieved sufficient diversion of excess farm labor into local or distant non-agricultural employment. Nor has the South had a sufficient influx of capital into agriculture to attain these goals. To be sure, some of the South's type-of-farming sub-regions have made more progress toward basic resource

adjustments and farm reorganization than others. But, thus far, differences in rates of natural increase and in the direction and extent of human migration and capital movements, have not been drastic enough to compensate for important differences in the physical resources of the several sub-regions. Hence, given unduly similar resource combinations in sub-regions differing widely in the quality of their physical resources, the relationship between physical conditions and human productivity may be greater than long-run economic theory would lead us to expect.

(3) *Nonetheless, the third hypothesis is that differences in human productivity of either kind are partly attributable to differences in the amount of capital per worker.* Wherever possible, therefore, this article will compare relative output with relative capital per worker. However, consideration will be given to some other possible causes of differences in human productivity which are unrelated (or only indirectly related) to aggregate capital inputs, while indicating still others requiring additional research before their importance can be determined.[3]

Thus far, we have dealt only with the conceptual aspects of our investigation. We shall defer until later in this paper a discussion of the limitations which our conceptual apparatus imposes upon the achievement of meaningful objectives. We must emphasize, however, the limitations of the basic statistical data which we here use to quantify our conceptual analysis. The editors of the special 1945 Census report make it clear that the instructions for enumerating the multiple-unit data were frequently misunderstood and misinterpreted by the enumerators. As a consequence, 27 per cent of the multiple units reported were "constructed" from individual farm schedules in Washington rather than enumerated as such in the field. Even worse, this important source of error was very unevenly distributed.[4] In addition, our data are further limited because all Census reports tend seriously to understate the gross value of product and value of capital in agriculture, while overstating the amount of farm labor used. Unfortunately, here again it cannot be assumed that the extent of under- and over-statement is evenly distributed among either types of operating units or type-of-farm sub-regions. The estimation of labor inputs is especially difficult, requiring certain arbitrary adjustments which cast serious doubt on our ability to reveal real differences between sub-regions

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[3] Space will not permit consideration of a fourth major hypothesis—that, because of the relatively great importance of multiple units in Southern agriculture, the region's distribution of gross income is much more concentrated than the Census "farm" data would indicate. The writer hopes to deal with this problem in a separate article to be published elsewhere.

[4] *Multiple-Unit Operations*, op. cit., p. xiii. The percentages "constructed" by states were as follows: South Carolina, seven per cent; Mississippi, 11 per cent; Arkansas, 21 per cent; Louisiana, 23 per cent; Georgia, 31 per cent; North Carolina, 37 per cent; Alabama, 48 per cent; and Virginia, 95 per cent.

TABLE 2. FARMS CLASSIFIED BY TYPES OF OPERATION (SINGLE OR MULTIPLE), 13 SUB-REGIONS OF THE OLD COTTON BELT, 1944

Type-of-Farming Sub-region	Number of Farm Operating Units by Type							No. of Multiple Units As % of Management Units	No. of Sub-units As % of Census "Farms"	Av. No. of Sub-units per Multiple Unit
	Single Units[a]	Multiple Units[a]	Sub-units[b]			Management Units[c]	Census "Farms"[d]			
			Home Farms[b]	Other Sub-units[b]	All Sub-units[a]					
Upper Tidewater	16,838	3,383	2,413	9,220	11,633	20,221	28,471	16.7%	40.9%	3.44
Flue-Cured Tobacco	43,181	12,638	9,637	33,936	43,573	55,819	86,754	22.6	50.2	3.45
S.C. Sand Hills	9,800	1,910	1,774	4,550	6,324	11,710	16,124	16.3	39.2	3.31
Upper Coastal Plain	67,071	11,316	10,434	29,088	39,522	78,387	106,593	14.4	37.1	3.49
Lower Coastal Plain	60,542	17,011	15,620	42,837	58,457	77,553	118,999	21.9	49.1	3.44
S. Piedmont	123,675	20,670	18,151	44,950	63,101	144,345	186,776	14.3	33.8	3.05
Limestone Valley	50,577	4,181	3,591	8,898	12,489	54,758	63,066	7.6	19.8	2.99
Black Belt	32,395	6,559	6,169	23,474	29,643	38,954	62,038	16.8	47.8	4.52
Clay Hills	36,960	8,005	7,684	16,868	24,552	44,965	61,512	17.8	39.9	3.07
Gulf Pinewoods	20,222	3,416	3,282	6,546	9,828	23,638	30,050	14.5	32.7	2.88
Brown Loam	32,209	7,956	7,756	30,906	38,662	40,165	70,871	19.8	54.6	4.86
Delta	74,780	16,488	15,792	112,802	128,594	91,268	203,374	18.1	63.2	7.80
W. Sandy Coastal Plain	47,816	3,441	3,081	10,039	13,120	51,257	60,936	6.7	21.5	3.81
Total	616,066	116,974	105,384	374,114	479,498	733,040	1,095,564[e]	16.0	43.8	4.10

[a] Compiled or computed from Type-of-Farming Area Table I of each state in *Multiple Unit Operations*, op. cit.

[b] Sub-units are the component parts of a multiple-unit operation, each sub-unit being considered a separate farm by the Census of Agriculture. Division of sub-units into home farms and other sub-units based on *ibid.*, Part III, Table I.

[c] The sum of single and multiple units.

[d] The sum of single units and sub-units.

[e] This total is about 66 per cent of the total number of Census "farms" reported in the eight states at least parts of which were included in the 13 sub-regions under study.

and (even more so) between single and multiple units in both labor inputs and output and capital per farm worker.[5]

Nonetheless, the 1945 Census provides the best available data on these important aspects of Southern agriculture. Hence, this analysis of the 1944 data, unreliable though they are, should at the least be useful (1) in providing crude statistical magnitudes for comparison with improved data as they become available; and (2) in suggesting methods by which the latter may be analyzed most fruitfully.

II. *Estimates of Output and Inputs per Farm*

In 1944, our area of 13 sub-regions had 616,000 single units and 117,000 multiple units, the latter comprising 479,000 sub-units (Table 2). Thus, there were 733,000 management units and 1,096,000 Census "farms." As a percentage of total management units, the number of multiple units ranged from less than seven per cent in the Western Coastal Plain to 23 per cent in the Flue-Cured Tobacco sub-region, averaging 16 per cent for the combined sub-regions. The number of sub-units (each a Census "farm") was 44 per cent of all Census "farms," ranging from 20 per cent in the Limestone Valley to 63 per cent in the Delta. For the 13-sub-region area, there was an average of 4.1 sub-units per multiple unit, the Gulf Pinewoods having a low of 2.9, the Delta a high of 7.8. With these important facts in mind, we present our estimates of output and capital, cropland, and labor inputs *per farm* for the several types of operating units in each of the 13 sub-regions.[6]

In subsequent analysis, output will be measured by the *gross* value of farm products sold, traded, or used on farms. The index of capital inputs will include only the value of land, buildings, implements, and machinery. Its validity obviously is limited by omission of the value of livestock—particularly important in the Black Belt, Brown Loam, and Lower Coastal Plains—for which special Census data were not available. For the same reason, there is no consideration of other relevant purchased inputs—such as feed, fuel, and fertilizer. For home-farm and other sub-units, we also lack the principal components of our index of capital.[7] Hence, acreage

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[5] Cf. footnote 8.

[6] Our 13 sub-regions accounted for 55 per cent of the nation's cotton production as well as for 74 per cent of the peanuts, 47 per cent of the flue-cured tobacco, 14 per cent of the rice, 11 per cent of the sugar cane, and seven per cent of the cattle and calves on farms. Of the total cotton produced in the 13 sub-regions, multiple units (with 48 per cent of the cropland harvested) accounted for 59 per cent, ranging from 37 per cent in the Limestone Valley to 73 per cent in the Delta. Of the total land in farms, 40 per cent of the land on multiple units and 33 per cent of the land on single units, was cropland harvested. (For the detailed data, see the mimeographed supplement referred to in footnote 2.)

[7] *Multiple-Unit Operations* (op. cit.) did not report the value of land and buildings separately for the two classes of sub-units. While there was a breakdown of the value

of cropland, adjusted for quality, also will be used as an alternative index of non-labor inputs. Estimates of labor inputs have been built up on the basis of a system of arbitrary weighting which has rather serious limitations.[8]

TABLE 3. CROPLAND HARVESTED (UNADJUSTED) PER FARM[a] AND INDEX OF COTTON YIELD[b] PER ACRE, SINGLE UNITS AND SUB-UNITS, 13 SUB-REGIONS OF OLD COTTON BELT, 1944

Type-of-Farming Sub-region	Single Units		All Sub-units		Home-Farm Sub-units		Other Sub-units	
	Acres of Cropland per Farm	Index of Cotton Yield	Acres of Cropland per Farm	Index of Cotton Yield	Acres of Cropland per Farm	Index of Cotton Yield	Acres of Cropland per Farm	Index of Cotton Yield
Lwr. Cstl. Plain	40.9	77	41.7	83	49.2	85	39.1	82
Upr. Tidewater	32.5	132	29.4	142	39.6	142	26.8	143
Delta	31.3	101	31.3	120	130.6	119	17.8	121
Upr. Cstl. Plain	31.0	88	40.6	107	71.9	115	29.3	104
S.C. Sandhills	28.5	96	35.4	109	59.5	119	26.0	106
Black Belt	25.1	76	29.5	92	65.3	100	20.1	90
S. Piedmont	24.6	88	30.7	99	41.2	105	26.4	97
Limestone Val.	24.3	92	39.0	105	66.0	110	28.1	103
Flue-Cured Tob.	23.8	126	22.7	132	29.7	134	20.7	131
Gulf Pinewoods	21.7	98	23.6	101	25.7	101	22.6	101
Clay Hills	21.0	92	23.4	100	28.5	105	21.1	99
Brown Loam	20.0	76	24.2	101	46.1	105	18.6	101
W.S. Cstl. Plain	19.8	50	28.9	72	52.6	76	21.6	71
13 Sub-regions	27.0	90	31.4	109	59.6	112	23.6	108

[a] Compiled or computed from Types-of-Farming Area Tables V and Part III, Tables V, of *Multiple-Unit Operations* (op. cit.)
[b] Average yield (386 pounds per acre) for all types of operations in the 13-sub-region area equals 100. Yields were computed from *ibid.*, Type-of-Farming Tables II, and Part III, Tables II.

Table 3 shows variations in size of farm (in terms of cropland acreage) and average cotton yields within the area under study. For this area as a whole, the average home-farm sub-unit had 60 acres of cropland, the

of implements and machinery, Part III, Table 1, it was almost entirely attributed to the home farm and, in any case, represented only a minor component of total capital inputs.

[8] In estimating total annual labor inputs, we followed a recent publication of the Bureau of Agricultural Economics (Ronald Jones and K. L. Bachman, *Size of Farms in the U. S.*, U. S. Dept. Agri., Tech. Bul. 1019, Washington, 1950, Table 19, p. 56). In brief, it was assumed that operators aged 65 and over contribute 0.4 man-year of labor each; all other operators (net of man-years of work off farm) 1.0 man-year each; male farm population aged 14 and over, other than operators, 0.7 man-year each; and female farm population aged 14 and over, 0.2 man-year each. Hired workers were estimated from total cash wages paid in 1944 and considered to contribute 1.0 man-year each. (The details of the statistical application of these weights to the original Census data, and their limitations, are described in the mimeographed supplement mentioned in footnote 2 above.) Undoubtedly, this basis of estimation introduces important absolute errors, failing to eliminate large elements of underemployment on farms. It also results in significant relative errors since identical weights are used for the same class of workers on each type of operating unit and in each sub-region. We have therefore concealed possible differences, among types of operation and among sub-regions, in the actual degree of underemployment and off-farm employment of non-operator family labor and the actual extent of female and child labor in farming.

TABLE 4. GROSS VALUE OF PRODUCT, VALUE OF CAPITAL, ADJUSTED ACRES OF CROPLAND HARVESTED, AND AVERAGE LABOR INPUT (ESTIMATED MAN-YEARS) PER FARM, SINGLE UNITS AND SUB-UNITS, 13 SUB-REGIONS OF OLD COTTON BELT, 1944

Type-of-Farming Sub-region	Gross Value of Product per Farm[a]	Value of Capital per Farm[b]	*Adjusted* Acres of Cropland per Farm[c]	Est. Man-Years of Labor Input per Farm[d]
Single Units				
Upr. Tidewater	$2,770	$4,591	42.9	1.984
Flue-Cured Tob.	2,721	4,064	30.0	1.805
Lwr. Cstl. Plain	1,841	3,442	31.5	1.767
Delta	1,817	4,061	31.6	1.699
S.C. Sandhills	1,588	3,428	27.4	1.635
Upr. Cstl. Plain	1,370	2,613	27.3	1.566
Limestone Val.	1,278	3,334	22.4	1.388
S. Piedmont	1,269	3,009	21.6	1.430
Gulf Pinewoods	1,146	2,116	21.3	1.339
Black Belt	1,134	2,459	19.1	1.425
Brown Loam	1,117	2,548	15.2	1.310
Clay Hills	1,087	1,936	19.3	1.332
W.S. Cstl. Plain	913	2,461	9.9	1.245
13 Sub-regions	$1,494	$3,097	24.3	1.522
All Sub-units				
Upr. Tidewater	$2,969	$4,257	41.7	1.821
Flue-Cured Tob.	2,813	4,009	30.0	1.729
Lwr. Cstl. Plain	2,030	3,307	34.6	1.682
Limestone Val.	1,986	4,377	41.0	1.691
Upr. Cstl. Plain	1,938	3,132	43.4	1.801
Delta	1,908	4,223	37.6	1.657
S.C. Sandhills	1,785	2,861	38.6	1.671
S. Piedmont	1,459	3,105	30.4	1.518
Brown Loam	1,412	2,783	24.4	1.402
Black Belt	1,322	2,675	27.1	1.411
W.S. Cstl. Plain	1,287	2,927	20.8	1.429
Clay Hills	1,277	2,063	23.4	1.321
Gulf Pinewoods	1,265	2,060	25.8	1.312
13 Sub-regions	$1,836	$3,439	34.2	1.600

Type-of-Farming Sub-region	Gross Value of Product per Farm[a]	*Adjusted* Acres of Cropland per Farm[c]	Est. Man-Years of Labor Input per Farm[d]
Home-Farm Sub-units			
Delta	$4,951	155.4	4.156
Upr. Tidewater	3,602	56.2	2.342
Upr. Cstl. Plain	2,991	82.7	2.755
Limestone Val.	2,893	72.6	2.328
Black Belt	2,781	65.3	1.943
Flue-Cured Tob.	2,688	39.8	2.006
Lwr. Cstl. Plain	2,654	41.8	2.110
S.C. Sandhills	2,644	70.8	2.382
Brown Loam	2,311	48.4	1.835
W.S. Cstl. Plain	2,022	40.0	1.730
S. Piedmont	2,009	43.3	1.781
Clay Hills	1,492	29.9	1.372
Gulf Pinewoods	1,427	26.0	1.353
13 Sub-regions	$2,794	66.8	2.313
Other Sub-units			
Flue-Cured Tob.	$2,849	27.1	1.644
Upr. Tidewater	2,814	38.3	1.673
Lwr. Cstl. Plain	1,803	32.1	1.525
Limestone Val.	1,620	28.9	1.433
Upr. Cstl. Plain	1,560	30.5	1.458
Delta	1,508	21.5	1.308
S.C. Sandhills	1,450	27.6	1.394
S. Piedmont	1,236	25.6	1.411
Brown Loam	1,186	18.8	1.292
Gulf Pinewoods	1,183	22.8	1.292
Clay Hills	1,180	20.9	1.297
W.S. Cstl. Plain	1,062	15.3	1.337
Black Belt	939	18.1	1.271
13 Sub-regions	$1,575	25.5	1.399

[a] Computed from *Multiple-Unit Operations*, op. cit., Type-of-Farming Area Tables I, II, and V for each state and (for home farms and other sub-units) from *ibid.*, Part III, Tables I. Value of product sold, traded, or used on farm.

[b] *Ibid.* Value of land, buildings, machinery, and implements only.

[c] Computed by multiplying actual cropland per farm by the index of cotton yield in Table 3, thereby attempting a rough adjustment for quality of land inputs.

[d] Computed from *ibid.*, according to the method outlined in footnote 8.

average single unit 27 acres, and the average other sub-unit 24 acres. The cotton yield per acre was above the regional average by 12 per cent on home-farm sub-units and by eight per cent on other sub-units, but 10 per cent below the regional average on single units. Cotton yields also varied widely among the several sub-regions (cf. Table 1 above). Under these circumstances, unless such obvious differences of quality are taken into account, cropland acreage is a very unsatisfactory index of land inputs. Actual cropland per farm has therefore been adjusted for its relative quality (Table 4), using the index of cotton yield as the best available conversion factor.[9]

[9] In all subsequent analysis, when sub-regions were ranked according to their respective outputs and capital and cropland inputs for each type of operations, the rank correlation coefficients were almost invariably improved considerably by using adjusted cropland rather than unadjusted (actual) cropland to measure land inputs.

Estimates of the absolute levels of average output, capital, adjusted cropland, and labor input *per farm* are presented in Table 4. For the 13-sub-region area, the average gross value of product in 1944 was $2,794 for home-farm sub-units, $1,575 for other sub-units, and $1,494 for single units.[10] All sub-units (home farms and other sub-units combined) outproduced single units by 23 per cent, using 11 per cent more capital, 41 per cent more adjusted cropland, but only 5 per cent more labor. Home-farm sub-units, with 175 per cent more adjusted cropland[11] and 52 per cent more labor, had an average output 87 per cent greater than single units. Other sub-units differed little from single units, the former having five per cent more output, five per cent more adjusted cropland, but eight per cent less labor. In each of the 13 sub-regions, all sub-units produced more per farm than single units although the former had less capital per farm in five sub-regions, less adjusted cropland in one sub-region, and less labor in seven sub-regions. In all but one sub-region, home-farm sub-units outproduced single units but, without exception, had more adjusted cropland and labor per farm. In only eight of the 13 sub-regions, however, did other sub-units produce more than single units, the former having more adjusted cropland in 9 of the 13 sub-regions but more labor in only 2 sub-regions.

Table 4 also indicates that, for each type of operation, there was a wide range in output per farm as well as in capital, adjusted cropland, and labor per farm in the various sub-regions. It is particularly noteworthy that, in general, the Upper Tidewater and Flue-Cured Tobacco sub-regions had a marked superiority in output per farm over the other sub-regions, including those (e.g., the Delta) with as much or more capital per farm. Even if these two sub-regions are omitted, however, there are still large differences in output per farm among the remaining 11 sub-regions. For single units, all sub-units, and other sub-units alike, the Lower Coastal Plains led the 11 sub-regions in output per farm, exceeding production in the lowest ranking sub-region in each case by 60-102 per cent with 40-61 per cent more capital, 45-218 per cent more adjusted cropland, and 20-42 per cent more labor. For home farms, the Delta produced 3.47 times as much as the Gulf Pinewoods with 5.98 times as much adjusted cropland and 3.07 times as much labor.

Finally, there was a rather high degree of consistency in the ranks of the 13 sub-regions according to output per farm and each of the several

[10] For all Census "farms" in the same region, the average value product was $1,643, the average capital per farm $3,247. For the farms of five Corn Belt states, the comparable data were $3,782 and $13,085, respectively.

[11] Apparently, much more of the average home-farm sub-unit's total cropland was devoted to hay and forage crops, orchards, and other less intensive uses than was true on either single units or other sub-units.

inputs per farm.[12] Hence, one is tempted to subject the data of Table 4 to a multiple-correlation analysis and other statistical manipulations, with a view to estimating the marginal value productivities of the several input items. In view of the many shortcomings of our data and the many variables embedded in our aggregates, however, such statistical refinements did not appear to be warranted.

TABLE 5. GROSS VALUE OF PRODUCT, VALUE OF CAPITAL, AND ADJUSTED ACRES OF CROPLAND HARVESTED PER MAN-YEAR OF LABOR INPUT, SINGLE UNITS AND SUB-UNITS, 13 SUB-REGIONS OF OLD COTTON BELT, 1944[a]

Type-of-Farming Sub-region	Value of Product per Man-Year	Value of Capital per Man-Year	*Adjusted* Acres of Cropland per Man-Year	Type-of-Farming Sub-region	Value of Product per Man-Year	*Adjusted* Acres of Cropland per Man-Year
Single Units				Home-Farm Sub-units		
Flue-Cured Tob.	$1,507	$2,252	16.6	Upr. Tidewater	$1,538	24.0
Upr. Tidewater	1,396	2,314	21.6	Black Belt	1,431	33.6
Delta	1,069	2,390	18.6	Flue-Cured Tob.	1,340	19.8
Lwr. Cstl. Plain	1,042	1,948	17.8	Brown Loam	1,259	26.4
S.C. Sandhills	971	2,097	16.8	Lwr. Cstl. Plain	1,258	19.8
Limestone Val.	921	2,402	16.1	Limestone Val.	1,242	31.2
S. Piedmont	887	2,103	15.1	Delta	1,192	37.4
Upr. Cstl. Plain	874	1,668	17.4	W.S. Cstl. Plain	1,169	25.1
Gulf Pinewoods	857	1,581	15.9	S. Piedmont	1,129	24.3
Brown Loam	852	1,944	11.6	S.C. Sandhills	1,110	29.7
Clay Hills	816	1,453	14.5	Clay Hills	1,087	21.8
Black Belt	796	1,780	13.4	Upr. Cstl. Plain	1,085	30.0
W.S. Cstl. Plain	733	1,977	8.0	Gulf Pinewoods	1,046	19.2
13 Sub-regions	$ 982	$2,035	16.0	13 Sub-regions	$1,208	28.9
All Sub-units				Other Sub-units		
Upr. Tidewater	$1,630	$2,338	22.9	Flue-Cured Tob.	$1,733	16.5
Flue-Cured Tob.	1,627	2,319	17.4	Upr. Tidewater	1,682	22.9
Lwr. Cstl. Plain	1,207	1,966	20.6	Lwr. Cstl. Plain	1,182	21.0
Limestone Val.	1,175	2,590	24.2	Delta	1,153	16.4
Delta	1,151	2,549	22.7	Limestone Val.	1,130	20.2
Upr. Cstl. Plain	1,077	1,740	24.1	Upr. Cstl. Plain	1,070	20.9
S.C. Sandhills	1,068	1,712	23.1	S.C. Sandhills	1,040	19.8
Brown Loam	1,007	1,985	17.4	Brown Loam	918	14.6
Clay Hills	967	1,562	17.7	Gulf Pinewoods	916	17.6
Gulf Pinewoods	964	1,570	18.1	Clay Hills	910	16.1
S. Piedmont	961	2,045	20.0	S. Piedmont	876	18.1
Black Belt	935	1,892	19.2	W.S. Cstl. Plain	794	11.4
W.S. Cstl. Plain	900	2,047	14.6	Black Belt	727	14.2
13 Sub-regions	$1,148	$2,149	21.4	13 Sub-regions	$1,126	18.2

[a] Computed from Table 4.

III. *Differences in Gross Labor Productivity*

Thus far, we have presented our output and input data on a *per-farm* basis. However, our initial hypotheses were stated in terms of outputs and inputs *per worker*. Hence, in Tables 5 and 6, the per-farm data of Table

[12] The rank correlation coefficients among the variables of Table 4 were:

Variables	*Single Units*	*All Sub-units*	*Home-Farm Sub-units*	*Other Sub-units*
Output, Capital	0.912	0.879	—	—
Output, Cropland (Adj.)	0.962	0.769	0.791	0.846
Capital, Cropland (Adj.)	0.868	0.703	—	—
Output, Labor	0.934	0.967	0.879	0.893

TABLE 6. GROSS VALUE OF PRODUCT, VALUE OF CAPITAL, AND ADJUSTED ACRES OF CROPLAND HARVESTED PER MAN-YEAR OF LABOR INPUT, SUB-UNITS AS A PERCENTAGE OF SINGLE UNITS, 13 SUB-REGIONS OF OLD COTTON BELT, 1944[a]

Type-of-Farming Sub-region	All Sub-units as % of Single Units			Type-of-Farming Sub-region	Home-Farm Sub-units as % of Single Units		Type-of-Farming Sub-region	Other Sub-units as % of Single Units	
	Value of Product per Man-Year	Value of Capital per Man-Year	*Adjusted* Acres of Cropland per Man-Year		Value of Product per Man-Year	*Adjusted* Acres of Cropland per Man-Year		Value of Product per Man-Year	*Adjusted* Acres of Cropland per Man-Year
Limestone Val.	128%	107.8%	150%	Black Belt	180%	251%	Limestone Val.	123%	125%
Upr. Cstl. Plain	123	104.3	139	W.S. Cstl. Plain	159	289	Upr. Cstl. Plain	122	87
W.S. Cstl. Plain	123	103.5	183	Brown Loam	148	228	Upr. Tidewater	120	106
Clay Hills	119	107.5	122	Limestone Val.	135	194	Flue-Cured Tob.	115	99
Brown Loam	118	102.1	150	Clay Hills	133	150	Lwr. Cstl. Plain	113	118
Black Belt	117	105.8	143	S. Piedmont	127	161	Clay Hills	112	111
Upr. Tidewater	117	101.0	106	Upr. Cstl. Plain	124	172	W.S. Cstl. Plain	108	143
Lwr. Cstl. Plain	116	100.9	116	Gulf Pinewoods	122	121	Delta	108	88
Gulf Pinewoods	112	99.3	114	Lwr. Cstl. Plain	121	111	Brown Loam	108	126
S.C. Sandhills	110	81.6	138	S.C. Sandhills	114	177	S.C. Sandhills	107	118
S. Piedmont	108	97.2	132	Delta	112	201	Gulf Pinewoods	107	111
Delta	108	106.7	122	Upr. Tidewater	110	111	S. Piedmont	99	120
Flue-Cured Tob.	108	103.0	105	Flue-Cured Tob.	89	119	Black Belt	91	106
13 Sub-regions	117%	105.6%	134%	13 Sub-regions	123%	181%	13 Sub-regions	115%	114%

[a] Computed from Table 5.

4 have been converted into output, capital, and adjusted cropland per man-year for further examination.

It was our *first hypothesis* that human productivity is greater on multiple-unit operations than on single-unit operations. Table 5 supports this hypothesis for the area under study in 1944. Gross product per man-year was $1,208 on home-farm sub-units, $1,126 on other sub-units, and only $982 on single units.[13] For comparisons among types of operation, however, the relative data of Table 6 are more convenient. There, gross output per man-year was 23 per cent greater on home-farm sub-units, and 15 per cent greater on other sub-units, than it was on single units. With only three exceptions (out of 26 possible), human productivity on either type of sub-unit exceeded that on single units in each separate sub-region as well. Thus, our first hypothesis is confirmed.

Our *second hypothesis*—that there are significant differences in human productivity among type-of-farming sub-regions—may be examined in Table 5. The output per man-year on single units was 2.1 times as great in the Flue-Cured Tobacco sub-region as in the Western Coastal Plain; on home-farm sub-units, 1.5 times as great in the Upper Tidewater as in the Gulf Pinewoods; and, on other sub-units, 2.4 times as great in the Flue-Cured Tobacco sub-region as in the Black Belt. Nonetheless, many of the differences between sub-regions in output per man-year probably were too small to be significant. On the other hand, there was a tendency for the sub-regions to group themselves in a fairly consistent pattern. Among these groups (if not within them), at least, our second hypothesis appears to be confirmed.

Determining reasons for these differences in human productivity—whether between types of operation or among sub-regions—is more difficult. It was our *third hypothesis* that such differences in productivity are partly attributable to measurable differences in capital per man-year.

Let us consider *differences among types of operations* first. Table 6 indicates that, for the 13 sub-regions combined, all sub-units did have six per cent more capital per man-year than single units and out-produced the latter per man-year by 17 per cent. Furthermore, in 10 of the 13 separate sub-regions, capital per man-year was greater on all sub-units than on single units. On the other hand, even in the three sub-regions in which all sub-units had *less* capital per man-year than single units, the former still had 8-12 per cent greater output per man-year. And, in the other 10 sub-regions, the relative advantage of all sub-units ranged only from 0.9 to 7.8 per cent more capital per man-year, as compared with

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[13] For all Census "farms" in the same region the gross value product was $1,053 per man-year, the capital $2,081 per man-year. The comparable data for five Corn Belt states were $2,521 and $8,723 per man-year.

8-28 per cent more output per man-year. While one would expect the marginal return of capital to be relatively high, this range in relative capital is certainly too small to account entirely for the much greater differences in relative output. Rather, it indicates that, throughout the region, capital-labor combinations varied relatively little between single units and all sub-units. Hence, other causes must be found to account for the general superiority of all sub-units over single units in output per man-year.

Although we cannot subject it to quantitative measurement, superior management of sub-units should probably receive considerable credit for their greater output per man-year. It also is interesting to note (Table 6) that quality-adjusted cropland per man-year was greater on all sub-units than on single units, showing a much wider range than did the relative capital on all sub-units. Furthermore, the relative output per man-year of all sub-units in the several sub-regions was somewhat more closely correlated with their relative adjusted cropland than with their relative capital per man-year.[14] For the entire region, home-farm sub-units had 81 per cent (and other sub-units 14 per cent) more adjusted cropland per man-year than single units. The home farms in every sub-region, and the sub-units in 10 of the 13 sub-regions, exceeded single units in cropland per man-year.[15]

But why shouldn't our index of capital reflect these differences in the quantity and quality of land? After all, land value is the major component of our index of capital. The latter might be expected to measure rather accurately not only differences in the quantity of land but also differences in its physical qualities and locational advantages. That it apparently does not may be due in part to the shortcomings of our basic Census data on capital and our technique of adjusting actual acreage of cropland for quality differences. Even so, it also suggests the possibility that the regional land market is too imperfect to reflect very accurately significant differences in the quality of land resources, even within the same subregion. In the South, for example, it is not at all uncommon to find heavy pressure on the local land supply by a population lacking alternative nonagricultural employment. When this occurs, the price of even very poor land is bid up to levels comparable to those of the nation's most fertile lands. Under such circumstances, a physical index of land inputs, adjusted for differences in yield of the region's principal crop, may con-

[14] For all sub-units relative to single units, the rank correlation coefficients among the data of Table 6 were as follows: output-capital 0.591; output-cropland 0.646; and capital-cropland only 0.401.

[15] For home farms and other sub-units, relative to single units, the rank correlation coefficients between output and cropland (Table 6) were 0.712 and only −0.129, respectively.

ceivably be more accurate than a value index of land inputs in explaining differences in human productivity.

Even if this conclusion is justified for 1944, however, it is likely to be less and less true in the future as resource readjustments are accelerated. In recent years, there have been important new developments in the technology of cotton production, increasing emphasis upon livestock production, changes in price-cost relationships, and a continuing large-scale shift of farm workers to local and distant non-farm employment. To some extent, these developments have probably already resulted in increased capital per worker in Southern agriculture since 1944. In any case, as the process continues, it may be expected that much additional capital—apart from that needed to enlarge existing land-holdings—will be invested in land improvements (fencing, buildings, woodlots, and pastures) and in important non-real estate assets (livestock herds and farm machinery). As a result, farmers will become less dependent upon the original physical qualities of land, imperfections of the land market will be reduced, and the level of human productivity will much more closely reflect the aggregate amount of capital per farm worker.

In this context, however, the differences revealed in this study between single units and multiple units become more significant. For the multiple-unit operator probably can adjust his factor combinations and scale of (sub-unit) operations more readily than the single-unit operator. First, it may be easier to reorganize a given large landholding into a smaller number of operating units than to expand an existing small single unit by the rental or purchase of additional land.[16] Second, and more important, the multiple-unit operator probably has (in addition to superior "know-how") easier access to the local capital market, permitting him to acquire with less difficulty the assets essential to reorganizing his farming operations on a more efficient basis.[17] For these reasons, we hope that these

[16] This difference can easily be overemphasized, however. Given the large exodus of farm workers from the South during 1940-50, there are certainly some areas in which the resulting labor "shortage" has made significant amounts of land available to small owner-operators who have remained behind. The latter's difficulties of access to the capital market are probably a more important barrier to farm reorganization than the inelasticity of the local land supply to particular farmers. Cf. T. W. Schultz, "A Framework for Land Economics—The Long View," *This Journal*, Vol. 33, 1951, pp. 204-15.

[17] On the capital side, the multiple-unit operator may have several other advantages over the single-unit operator: greater personal resources for self-finance; less need for incurring (additional) mortgage indebtedness; and a greater proportion of his total capital resources available for increased working capital and the acquisition of essential non-real estate assets. Again, however, there are certainly some Southern areas in which small single-unit farms have been able to acquire the capital required for effective reorganization. This has happened primarily in those areas which have experienced a recent influx of non-agricultural capital, resulting in local industrialization and/or the development of more intensive, specialized farm enterprises (e.g. broiler production).

statistical comparisons, by casting some light on the nature and extent of multiple-unit operations in the mid-1940's, will encourage similar analyses of any multiple-unit data which may emerge from the 1950 Census of Agriculture.

Finally, let us consider our *third hypothesis* with reference to *differences in human productivity among sub-regions.* To what extent can these geographical differences be attributed to differences in capital per man-year among sub-regions? The data of Table 5 indicate that the relationship between output and capital per man-year was not very close for either single or all sub-units.[18] For example, single units and all sub-units in the Flue-Cured Tobacco and Upper Tidewater sub-regions produced 39-63 per cent more output per man-year than those in the Limestone Valley, while the latter had slightly more capital per man-year. Or, again, single units in the Piedmont, Upper Coastal Plain, Gulf Pinewoods, and Brown Loam had nearly the same output ($852-887) per man-year but their capital per man-year ranged from $1,580 to $2,103.

On the other hand, differences in combinations of farm products produced appear to have a significant effect on human productivity in the several sub-regions. Thus, for each type of operations, the three tobacco-peanuts sub-regions (Cf. Table 1) ranked among the top five sub-regions in value product per man-year. During the war, tobacco was greatly favored by the concurrence of much increased marketing quotas and high prices; peanuts by very high government-guaranteed prices aimed at a rapid expansion of domestic vegetable-oil production. Hence, the three sub-regions physically suited for these crops were in a very favorable economic position and, through greater diversification, probably were able to utilize their available labor force more fully than the other sub-regions. Furthermore, for home-farm sub-units only, the two cotton-livestock sub-regions ranked within the first four in human productivity. On the other hand, single units and other sub-units in one of these two sub-regions (the Black Belt) ranked near the bottom. This would indicate that most of the livestock of this sub-region was concentrated on existing, relatively large home-farm sub-units.

To be sure the other operating units in the same sub-region, if properly reorganized, presumably could have attained similar income benefits from livestock production. But they had not yet done so. Hence, their man-year productivity was narrowly limited by the suitability of their limited physical resources for rather specialized cotton production. The same was probably true for the other sub-regions, although most of them are physically capable of profitable livestock and dairy production, given radical changes in factor combinations and scales of operation.[19]

[18] The rank correlation coefficients were 0.679 and 0.455, respectively.

[19] If it were possible to recombine resources in the several sub-regions to achieve

With the exceptions mentioned, reorganization of farm resources had not proceeded far enough in most sub-regions by 1944 to free the level of human productivity from heavy dependence upon the particular physical conditions of cotton production prevailing in each. Thus we find (Table 5) that, for each type of operations, the output per man-year in each sub-region was more closely related to its adjusted cropland per man-year than to its capital per man-year.[20] If the output and cropland data for single units, home-farm sub-units, and other sub-units are plotted on the same scatter diagram, it becomes clear that—if the Flue-Cured Tobacco and Upper Tidewater sub-regions are omitted—the two variables are rather highly correlated.[21]

While differences in the human productivity of our 13 sub-regions have been caused by a complex of economic and physical differences, physical factors appear to have been of predominant importance up to 1944. In the South, the characteristically high ratio of labor to both land and capital resources has apparently brought a common dependence upon intensive production of one or two crops, and rather similar factor combinations and scales of operation, in the several sub-regions despite wide differences in the quality of their physical resources. Consequently, human productivity has been closely related to physical conditions (which land values failed fully to reflect), since the latter largely control the yield per acre of the common crop (cotton) and the extent to which, *without additional land or capital resources*, a particular farm's labor force can combine other farm enterprises with cotton production.

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maximum efficiency, *cotton-dairy* combinations would appear to be economically feasible in parts of the Piedmont, Upper Coastal Plain, and South Carolina Sandhills; *dairy-cotton* combinations in the Black Belt, Limestone Valley, and Brown Loam sub-regions; *beef-hogs-cotton* in the Black Belt and Brown Loam; *cotton-cash grain* and *cotton-beef (roughage-fed)* in the Delta; *cotton-livestock* in the Western Coastal Plain; and *peanuts-cotton* in the Upper Coastal Plain. Even so, some specialized crop production would remain in the Flue-Cured Tobacco sub-region (tobacco), parts of the Piedmont and Lower Coastal Plain (cotton); and parts of the Upper Tidewater and Lower Coastal Plain (peanuts). The Clay Hills and Gulf Pinewoods would combine cotton with general farming. See *Study of Agricultural and Economic Problems of the Cotton Belt*, U. S. House of Representatives, 80th Congress, 1st Session, Hearings before Special Subcommittee on Cotton of the Committee on Agriculture, Washington, 1947. Pp. 6-65, especially Table 5 (p. 36) and accompanying text.

[20] The rank correlation coefficients between output and adjusted cropland per man-year were: 0.846 for single units, 0.497 for all sub-units; 0.643 for other sub-units, but only 0.195 for home-farm sub-units.

[21] On each type of operating unit, value product per man-year in the Flue-Cured and Tidewater sub-regions is far above its expected value in terms of adjusted cropland. If they are eliminated, it is estimated that—up to 20-22 acres of cropland (adjusted), each additional acre per man-year added about $40 to output per man-year. For further increases in acreage up to 38 acres, the output increased at a rapidly diminishing rate. In the upper part of the range, which included only home-farm sub-units, output per man-year was unusually high for the Black Belt (probably due to its livestock production) and inexplicably low in the South Carolina Sandhills, Upper Coastal Plain, and Delta.

Given sufficient time for far-reaching basic resource adjustments and farm reorganization, this situation will not persist, however. Certainly, general economic conditions are ultimately dominant over narrowly physical conditions in determining geographical differences in human productivity within agriculture. Among these economic conditions, apart from differences in long-distance emigration of farm workers, are the rate of natural population increase, the extent of local alternative nonagricultural job opportunities, local price-cost relationships, and the adequacy of local capital resources and financial, marketing, and service institutions available to agriculture. All of these conditions are primarily a function of the degree of development of industrial-urban centers, which favor nearby farming areas, speeding types of farm reorganization which raise human productivity. Hence, even farms similar in their physical characteristics may have very different levels of human productivity because of differences in their proximity to industrial-urban centers. Similarly, among type-of-farming sub-regions, differences in productivity per worker may in part reflect differences in the industrial-urban development of the several areas.

While industrial-urban development is in a relatively early stage in most parts of the Old Cotton Belt, significant differences do exist within the region. However, there were no significant relationships between the output per man-year and percentage employed in manufacturing in the several sub-regions.[22] This should not surprise us. Our geographical classification of farms has not only been physically oriented but is much too broad to reveal more localized relations between general economic development and human productivity within agriculture. For the latter purpose, farms within much more limited areas would have to be classified according to their proximity to industrial-urban centers.[23]

In closing, it should be emphasized that other possible causes of differences in human productivity have been treated only incidentally, if at all. Among these, differences in tenure systems, racial composition of the population, managerial skills, the adaptability of resources to technological developments, the composition of capital assets, and location relative

[22] Here all rank correlation coefficients were negligible. Of course, our estimates of labor inputs indirectly took the latter into account by deducting farm operator's worktime off the farm (see footnote 8). However, similar adjustments for off-farm employment of other family labor were not possible and, as is well known, manufacturing employment of farm women is quite common in Southern industry.

[23] Cf. Schultz, *loc. cit.*, pp. 205-06. The writer is currently engaged in a new research project which will follow such a system of classification and comparison within selected local areas of the South. This project is outlined in detail in William H. Nicholls, "A Research Project on Southern Economic Development, with Particular Reference to Agriculture," *Economic Development and Cultural Change,* University of Chicago Press, September 1952.

to raw materials (feeds and fertilizers), certainly should be mentioned. However, meaningful consideration of these many important variables can hardly be fruitful unless the aggregates dealt with in this paper are broken down and refined far more than the present analysis would permit.

IV. *Conclusions*

The principal contribution of this paper has been a detailed analysis of the differences between the characteristics of single-unit and multiple-unit operations in the Old Cotton Belt. If it has helped to overcome the limitations of the usual Census concept of a "farm"—as commonly applied to the structure and organization of Southern agriculture—our efforts have been fully rewarded.

However, we have also tried to create a greater sense of the heterogeneity of the Southern region. We have revealed some significant differences between types of operation and among type-of-farming sub-regions –including differences in output per man-year of labor input. But we have not found it possible to determine the causes of these differences very satisfactorily. That we have been forced to emphasize physical causes—despite our original hypothesis that capital per worker was a major factor—is disturbing to an economist. Nonetheless, even apart from the limitations of our basic data and our physically-oriented geographical classification, such a conclusion seems justified in view of the gross mal-allocation of agricultural resources and the many imperfections of the land, labor, and capital markets in the South.

Given such widespread economic disorganization, physical causes probably *are* important *in the short run.* That they need be in the long run, the economist must deny. In doing so, however, he must accept the responsibility for developing the basic research essential for a fuller understanding of the South's resource problems and appropriate remedies by which they may be solved in the general public interest. Only thus can he help to strike the bonds from men who have found Nature niggardly because—as producers, *not* consumers—they demanded too much.

DIVERSIFICATION IN RESOURCE ALLOCATION AND MINIMIZATION OF INCOME VARIABILITY[1]

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DIVERSIFICATION is one of the precautions which resource administrators or managers can use in adjusting to an uncertainty situation. The logic inherent in this production procedure has application in any situation where choice must be made in respect to a future characterized by imperfect knowledge. It applies not only to individual farm management but also to administration of an agricultural economics department, an army, or other economic units which employ resources and must make decisions about the future.

There are, of course, two different aspects of diversification. One is a problem of planning under perfect knowledge. An individual farmer, wishing to maximize profits, must equalize the marginal rate of product substitution with the price ratio of the products. The optimum degree of diversification or specialization is then dependent, to a large degree, on the technical relationships between inputs and outputs for each product and any technical conditions of complementary or supplementary for the products when they are produced in combination. The task before the decision-maker under this situation is that of maximizing profit (or maximizing scientific product in the administration of an agricultural economics department, maximizing military successes for an army, etc.).

The other aspect of diversification is that of minimizing the variance of outcome, of attempting to put a floor under the income level or in preventing the occurrence of undesirable outcomes. The farm manager, unable to predict price and yield outcomes, may wish to select a combination of enterprises which gives a steady year-to-year flow of income. He also may attempt to combine enterprises in a manner to minimize the probability that income will drop below levels required to meet family living expenses, farm costs, and principal payments. Or, he may simply attempt to minimize the probability that his business will become bankrupt in any specified period.

Although one aspect of diversification deals with minimizing variance of returns (or the probability of undesirable outcomes), the two are highly related. Minimization of income variance is a short-run goal of resource administration; it is a means to long-run maximization of returns.

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Adoption of a short-run production pattern which prevents bankruptcy keeps the entrepreneur "in the game," with opportunity to maximize returns in the long-run. Again, the same logic applies to other types of administration and decision-making, the only difference being the quantity which the entrepreneur or administrator is trying to maximize.

In this paper we attempt to extend the logic of diversification and to show certain empirical applications of it. Our interest is in diversification as a planning procedure under imperfect knowledge. While the adaptions made here are in terms of a farm as a firm and profit considerations; the logic obviously applies to other types of resource administration and decision or choice-making.

The topic of diversification as a means of handling uncertainty is an old one in agricultural economics. Statements on the subject can be found in all farm management texts and in many policy discussions. Farm leaders, agricultural economists, bankers and others have exhorted farmers to "get away from high-risk, one-crop farming," particularly in geographic regions as the Great Plains and the Southeast.

Although the topic is old, little systematic or formal thinking has been applied to the planning procedure. Elementary farm management books seldom go further than a statement to the effect that "diversification, not putting all of your eggs in one basket, often is a wise procedure for a farmer who is not in a position to undertake great risks". The statement contains wisdom but it has limitations in that the full application of diversification is not explained. Nothing is said about the conditions under which diversification is desirable or about costs. Similarly, very little empirical analysis has been applied to diversification as a method of reducing income variability. Finally, economic theory has centered around production planning under perfect knowledge to an extent that the subject of diversification, except as a problem in product-product choice under certainty, has gone largely untouched. Even the more recent writings on risk, uncertainty, and dynamic planning unravel few of the implications of diversification.

Purpose of this paper is to help fill the gaps on all three fronts. First, we attempt to develop additional principles and logic relating to diversification. Second, we explain the conditions under which diversification applies. Third, we make some empirical applications of the principles. While there are two important facets of the diversification problem—the efficiency of different systems of diversification in reducing income variance or in minimizing the probability of loss and the effect of diversification on efficiency in resource use—this paper is devoted to the first alone.

Systems of Diversification

Diversification can be accomplished in two quite different methods. (1) The amount of resources can be increased: Under this system a farmer

producing product A with $15,000 of capital and labor might diversify by adding another $15,000 in order to produce both A and B. (2) The amount of resources can be held constant while part of them is shifted to other products: If the farmer has $15,000 and is producing A, he can shift $7,500 to B and produce both.

The first system has ramifications highly related to the capital and increasing risk considerations. The system is sometimes suggested by bankers who would like to see farmers use more capital while "spreading their risks." The second system has more widespread application since most farmers have limited capital.

Income variability can be lessened through diversification only if the prices or yields of the products bear the proper correlations. If the prices, yields, and incomes have a correlation coefficient of $+1.0$, combination of two products need not reduce variability. If the correlation coefficient is -1.0, the two enterprises serve optimally as an uncertainty precaution. A correlation coefficient of zero is preferable to greater correlation coefficients.

Diversification may be employed as a method of handling two aspects of income variability. First, the operator may think in terms of the variability of income over his entire operating career. In this case, the number of years involved become a population of production periods for which he may wish to minimize income variability. Second, the operator may think in terms of possible large profits or possible large losses in a single year. In the latter case, he may attempt to treat the single year as a "sample" and organize his resources to minimize the chance of a large loss. While similar, the two considerations are not identical and need not lead to the same course of action. A system of farming may allow low variability of income over the farmer's career, but it also may allow infrequent large losses.

First, let us consider diversification as an attempt to minimize income variability over the entire population of years in which the farmer operates. Variance, computed in the manner of elementary statistics, will be used as a measure of variability.[2] The resulting statements are in terms of expected values.

Aside from the "sampling considerations" outlined below, and consider-

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[2] Farmers are not interested directly in the variance figure *per se* since its computational details are not directly related to the variability figure which concerns them. In statistics the variance, σ^2, is computed by dividing the sum of the squared deviations between the individual observations (x_i) and the mean ($\bar{x}$) by the number (n) of observations included in the population (or by n-1). Thus while $\sigma^2 = \sum_{i=1}^{i=n} \frac{(x_i - \bar{x})^2}{n}$, the farmer more nearly views variability over his operating career in the sense of

ing that different income populations are represented by different enterprises, the first system of diversification outlined above, adding an enterprise through additional resources, can either increase or decrease income variance. When two enterprises, A and B, with variances σ_A^2 and σ_B^2 respectively are combined, the variance for the total operation, σ_T^2, becomes $\sigma_T^2 = \sigma_A^2 + \sigma_B^2 + 2\rho\sigma_A\sigma_B$. This equation states that the variance for the combined operation is equal to σ_A^2, the variance for enterprise A, plus σ_B^2, the variance for enterprise B, plus the covariance which is defined as $2\rho\sigma_A\sigma_B$ where ρ is the correlation coefficient for the two enterprises and $\sigma_A\sigma_B$ represents the standard deviations (the square roots of the variances) for the income of each respective enterprise. Now if incomes from the two enterprises have a zero correlation coefficient (ρ is zero) the equation becomes $\sigma_T^2 = \sigma_A^2 + \sigma_B^2$. Hence, the addition of enterprise B to enterprise A will always increase variance (for the combined operation as compared to specialization in A alone) regardless of the relative variance for enterprise B. If ρ, the correlation coefficient, is $+1.0$ the equation becomes $\sigma_T^2 = \sigma_A^2 + \sigma_B^2 + 2\sigma_A\sigma_B$ and variance will be increased by even more than in the previous case. If, however, the correlation coefficient is -1.0, the equation becomes $\sigma_T^2 = \sigma_A^2 + \sigma_B^2 - 2\sigma_A\sigma_B$. The variance under the combined operation can now be less than for A alone; addition of enterprise B will reduce the total variance if the quantity, $2\sigma_A\sigma_B$, is greater than σ_B^2, the variance for B alone. That is to say, total variance (σ_T^2) will remain unchanged if the ratio $2\rho\sigma_A\sigma_B/\sigma_B^2$ is equal to 1.0, decrease if it is greater than 1.0, and increase if it is less than 1.0. Since this term reduces to $2\rho\sigma_A/\sigma_B$, the quantity becomes $2\sigma_A/\sigma_B$ when ρ is equal to -1.0 and total variance will be reduced as long as the standard deviation (the square root of the variance) for B is less than twice is great as the standard deviation of A. If ρ is equal to $-.5$, the term becomes σ_A/σ_B and total variance is reduced if the standard deviation of B is less than the standard deviation of A.

Diversification With Limited Resources

The outcome can be quite different under the second method of diversification, diversion of part of the resources from one enterprise to another. Let us examine the case where the nature of returns to scale need not be considered (e.g. we might postulate constant returns within the short-run

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the figure obtained as $\sum_{i=1}^{i=n} \frac{(x_i - \bar{x})}{n}$

where positive and negative signs are disregarded. We use the variance concept because we can make more precise statements about its expected value for a population of incomes. However, the inferences drawn from the magnitude of the variance will be in the same direction as the inferences which might be based on the average deviation from the mean measured in the simple manner above.

plant, a realistic situation for many phases of farming). A given quantity, X, of resources has been used for enterprise A. We now decide to use one-half for A and the remainder for B. The equation for the total variance now becomes $\sigma_T^2 = .25\sigma_A^2 + .25\sigma_B^2 + \rho\sigma_A\sigma_B/2$. When ρ (the correlation coefficient) is zero, the equation reduces to $\sigma_T^2 = .25\sigma_A^2 + .25\sigma_B^2$; total variance will be decreased if $.25\sigma_B^2$ is less than $.75\sigma_A^2$, the amount by which variance for enterprise A is reduced. In other words, total variance decreases if the ratio $.75\sigma_A^2/.25\sigma_B^2$ is greater than 1.0. Since the ratio reduces to $3\sigma_A^2/\sigma_B^2$, total variance will decrease as long as variance for enterprise B is not three times as great as the variance for enterprise A. When ρ is $+1.0$ the equation reduces to $\sigma_T^2 = .25\sigma_A^2 + .25\sigma_B^2 + \sigma_A\sigma_B/2$ and the combined variance will be increased if the sum $.25\sigma_B^2 + \sigma_A\sigma_B/2$ is greater than $.75\sigma_A^2$, the reduction in variance of A. When ρ is equal to -1.0, the equation reduces to $\sigma_T^2 = .25\sigma_A^2 + .25\sigma_B^2 - \sigma_A\sigma_B/2$ and diversification leads in the direction of a lowered variance; diversion of one-half the resources from A to B will increase variance only if $.25\sigma_B^2$ is greater than the sum, $.75\sigma_A^2 + \sigma_A\sigma_B/2$.

Reduction in Variance

If we have knowledge of the variance for individual enterprises, we can also make quantitative statements about the reduction in income variability as different combinations of enterprises are produced with given resources. Again, suppose that we have a quantity of resources equal to X and that this amount can be divided between A and B in any manner we select. If σ_A^2 and σ_B^2 refer to the income variance for the two enterprises respectively when X quantity of resources is used for either and if the proportion of the total resources used for A is denoted as q, the total variance then can be denoted as I below:

$$\sigma_T^2 = q^2\sigma_A^2 + (1 - q)^2\sigma_B^2 + 2\rho q(1 - q)\sigma_A\sigma_B. \qquad (I)$$

Total variance is now a function of q, the proportion of resources allocated to either enterprise. We can compute the change in total variance as q, the proportion of resources devoted to enterprise A, takes on different magnitudes. This change in total variance, $d\sigma^2_T/dq$, can now be computed as a derivitive in the manner of II below:

$$\frac{d\sigma_T^2}{dq} = 2q\sigma_A^2 - 2(1 - q)\sigma_B^2 + 2\rho(1 - 2q)\sigma_A\sigma_B. \qquad (II)$$

We will make use of this equation in a later section where we measure the reduction in variance as we change the pattern of resource allocation.

Minimizing the Probability of Bankruptcy

We now turn to diversification as a "safeguard" for a single year or two.

The analysis above supposed that the operator was interested in minimizing the variance of income over some period, perhaps his operating career. Since unfavorable outcomes in a single year may bankrupt the operator with little capital or a low equity, he may diversify in order to increase the chance that high incomes as well as low income may be realized. The logic used can be that of sampling theory where it is known that as the number of observations drawn from a single population is increased, the variance will decrease. The farmer may simply view different enterprises as if they were different observations drawn from a single population of incomes.[3] With an increased number of enterprises, the chance is increased that a high income for one will accompany a low income for another, if returns for different enterprises do not have a high positive correlation. (Previous statements about the magnitude of the correlation coefficient apply here as well as in the earlier examples of diversification. Two negatively correlated enterprises help guarantees some income in a single year.) This logic of diversification and its implications can be illustrated partly by means of Figure 1 where the production possibilities for products Y_1 and Y_2 are represented by curve AB.

Let us suppose that among his expectations the farmer includes two hypotheses for price relationships of the future. The first hypothesis, H_1, suppose the price relationship indicated by iso-revenue line DB: it calls for specialization in Y_2 if it is actually realized and profits are maximized. The second hypothesis, H_2, postulates the price relationship indicated by AC:

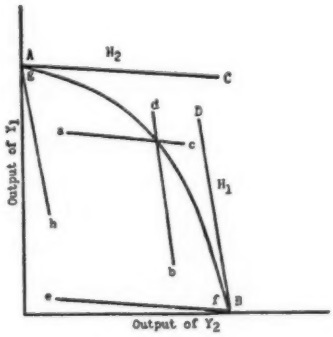


FIGURE 1

[3] Sampling theory also states that variance can be decreased as homogeneity of the population is increased. Hence our earlier statement, that the farmer interested in stability should select single enterprise with few fluctuations, can be justified in the logic of statistics.

it calls for production of Y_1 alone. If the entrepreneur produced Y_2 alone, the action consistent with H_1, and the price relationship of H_2 is actually realized, income is at the low level indicated by revenue line *ef* rather than at the maximum denoted by AC and by specialization in Y_2. (The two revenue lines have the same slope and denote the same price relationship.) If plans are in terms of H_2 only, and Y_1 alone is produced, income will be that indicated by *gh* (rather than that indicated by DB). Hence to help minimize the chance of income as low as *ef* or *gh*, the entrepreneur may select a combination of the two products such as that indicated at S. While income will be only at the level of *db* or *ac* if hypothesis H_1 or H_2 respectively come about (rather than at the maximum of DB or AC), the probability of incomes as low as *gh* and *ef* has been lessened. While the chance of low income is lessened, the chance of high income also is lessened under diversification.

TABLE 1. EFFECT OF TWO FORMS OF DIVERSIFICATION ON VARIANCE OF GROSS INCOME AND MINIMUM INCOME. FORT HAYES, KANSAS, 1910–50

Crop Combination	Variance (σ^2) (000)	Standard (Deviation (σ)	Correlation Coefficient Between Pair (ρ)	Minimum Income in Any One Year
100 Acres Wheat Alone	5,058	2,249		0
100 Acres Milo Alone	1,885	1,373		0
100 Acres Barley Alone	2,908	1,705		0
200 Acres: 100 Each Wheat and Milo	8,549	2,924	.26	105
200 Acres: 100 Each Wheat and Barley	12,875	3,588	.64	0
200 Acres: 100 Each Milo and Barley	6,947	2,636	.46	0
100 Acres: 50 Each Wheat and Milo	2,137	1,462	.26	53
100 Acres: 50 Each Wheat and Barley	2,943	1,985	.64	0
100 Acres: 50 Each Milo and Barley	1,939	1,393	.46	0

Source: Based on yields from experimental results at Fort Hayes, Kansas and local prices.

Some Empirical Applications

The models outlined on previous pages are well adapted for application to agricultural data. While simple models, they can have widespread application in predicting the reduction in variance which is possible from different patterns and degrees of diversification. Data for application of these models to crop production are available in most geographic areas. The equations of previous pages are employed to compute income variance under different diversification patterns in Tables 1 and 2. If the variance for individual crops over a period in the past are known, the variance for all combinations of these crops can be predicted for the same period, even if data for combinations are not available. Also, if the future were to parallel the past in any close manner, prediction can be made of the effect of different diversification systems over the time period ahead. The 50-50 diversification patterns outlined in Tables 1 and 2 do not

necessarily specify minimum income variance; procedures for determining minimum income variance are explained later.

Data for individual crops in Table 1 provide the information needed for predicting income variance under diversification. First let us examine variance when wheat and milo are employed for purposes of diversification. We wish to compare variance of gross income when 100 acres of milo are added to 100 acres of wheat, our first system of diversification. Variance for 100 acres of wheat grown alone is 5,058,217, variance for 100 acres of milo grown alone is 1,885,150. If we fit these figures along with the statistics for the standard deviations and the correlation coefficient from Table 1, our equation for the total variance, where the quantity of resources is doubled, becomes $\sigma_T^2 = 5{,}058{,}217 + 1{,}885{,}150 + (2)\ (.26)\ (2{,}249)\ (1{,}373)$ or 8,549,063. In this case, production of 100 acres each of wheat and milo increases total gross income variance since the correlation coefficient is positive and the covariance term ($2_\rho\sigma_A\sigma_B$) is added to the individual variances. Because of positive correlation coefficients, no two crops can be grown together without an increase in absolute variance.

Diversification With Limited Resources

If we examine the second system of diversification, diversion of 50 acres from wheat to milo, the equation becomes $\sigma_T^2 = (.25)\ (5{,}058{,}217) + (.25)\ (1{,}885{,}150) + (.5)\ (.26)\ (2{,}249)\ (1{,}373)$. Absolute variance is less when 100 acres is devoted to 50 acres each to wheat and milo than when 100 acres is devoted to wheat alone. Variance under diversification (production of 50 acres each of wheat and milo as compared to 100 acres of wheat) is less because the correlation coefficient is low. Although ρ is positive, the value .26 causes the sum of the covariance term plus one-fourth the variance for milo to be less than three-fourths the variance for wheat. (See earlier discussions of conditions under which diversification will lessen variance.)

While computed on the basis of a single acre and net rather than gross income, the data of Table 2 include similar applications of the second system of diversification. Although the correlation coefficient for corn and oats is .9, income variance is less for one acre devoted one-half each to corn and oats than under corn alone because of the low absolute variance for oats. A combination of hay and wheat has a variance lower than for either crop grown alone because the correlation coefficient, while it is positive, is very small.

Minimum Income and Relative Variability

Resource managers also must make choices between increasing income and reducing variability of income (or the probability of loss). The choice to be made will be unique to each manager and, among other things, will

depend on his risk preference, capital, equity, and family responsibilities. We can, however, point out some of the implications of these choices in Table 2. A combination of corn and oats reduces absolute variance by 64 per cent when compared to corn alone. Accompanying this reduction in variance also is a reduction in income by 50.4 per cent. Actually, variance is increased relative to income since the coefficient of variation is only 90 per cent for corn alone but is 107 per cent for the corn-oats combination. Combinations such as corn and hay or wheat and hay not only reduce

TABLE 2. EFFECT OF ONE FORM OF DIVERSIFICATION ON NET INCOME VARIANCE AND MINIMUM INCOME. LOGAN TOWNSHIP, MONONA COUNTY, IOWA, 1910–50

Crop Combination	Variance (σ^2)	Standard Deviation (σ)	Correlation Coefficient Between Pair (ρ)	Mean Income ($\bar{x}$)	Coefficient of Variation as Per Cent ($\sigma/\bar{x}$)	Minimum Income in Any One Year
One Acre Devoted Entirely to:						
Corn	234.4	15.3		$16.84	90	−6.49
Oats	20.7	4.5		.12	3750	−4.62
Hay	79.6	8.9		12.19	73	−4.11
Wheat	129.7	11.4		11.33	101	−5.52
One Acre Devoted One-half Each to:						
Corn-oats	94.0	9.7	.88	8.48	107	−11.09
Corn-hay	109.2	10.4	.45	14.52	72	−3.37
Corn-wheat	148.6	12.1	.66	14.09	86	−11.58
Oats-hay	36.9	6.1	.59	6.16	99	−11.26
Oats-wheat	60.1	7.8	.68	5.73	128	−6.59
Hay-wheat	70.6	8.4	.36	11.76	72	−2.42

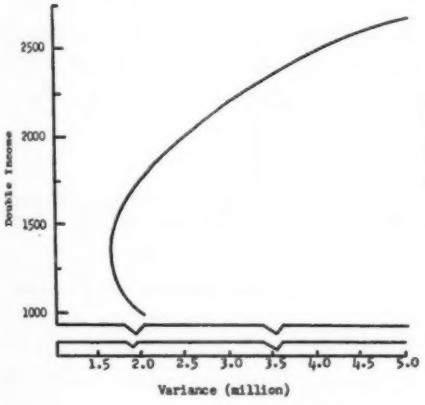
Source: Based on township yields with revenue and costs computed in terms of prices in each year. Costs have been computed to allow for differences in scale for each crop when total acreage is 100.

absolute variance but also result in slight reductions in relative variance (variance relative to income); the sacrifice in income is only slight. Combinations such as these—which result in little or no sacrifice in income, lower the minimum income received in any one year, and lessen both absolute and relative variance—are most efficient diversification systems.

It is possible, of course, that farmers in some areas may select large sacrifices in incomes for producing patterns which minimize the probability of loss or bankruptcy. The "minimum income" figures are suggestive of the possibilities here. While a combination of wheat and milo still results in a "large" absolute variance (Table 1), even the poorest year results in some revenue. Addition of other crop and livestock products to the combination included would undoubtedly increase the level of minimum income.

Production Possibilities and Efficiency

The literature in theory has included numerous discussions about the nature of production possibilities wherein income and the degree of uncertainty are compared. Generally these assume that the "possibility curve", with income graphed on the vertical axis and "degree of uncertainty" graphed on the horizontal axis, will be concave from below. This notion is based on the assumption that the range or dispersion of outcomes is a linear function of income. However, since it is supposed that uncertainty increases at an increasing rate with dispersion of outcomes, the relationship between income and uncertainty is a (subjective) curvilinear relationship. From the data and variance equations presented previously, we have computed some (empirical) relationships between magnitude of income and variance of income as affected by diversification. These also are non-linear and do not necessitate assumption of subjectively greater rates of discount.



Wheat-Milo Combinations, Kansas Data

FIGURE 2

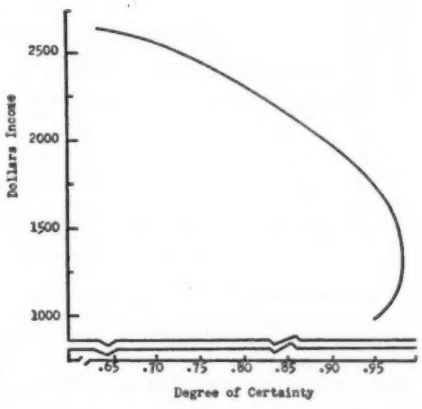
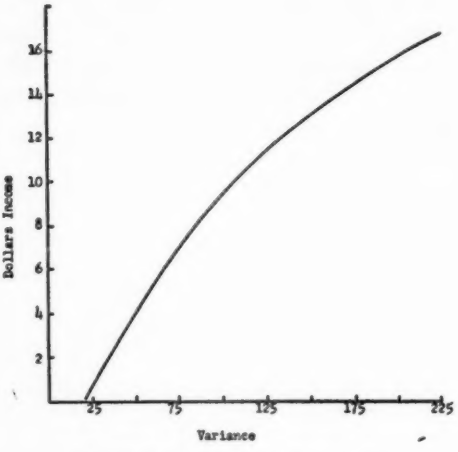


FIGURE 3

Figure 2 illustrates the combinations between income and variance when 100 acres are allocated between wheat and milo in various proportions. (The per acre gross income averaged $26.68 for wheat and $10.16 for milo over the period studied.) With the entire 100 acres devoted to wheat (still without assuming any scale economies), gross income over time averages $2,668 while income variance is 5,058,217. Income variance can be reduced by a shift in acres from wheat to milo but an increasing sacrifice in income is necessary until approximately 80 acres are in milo. In other words, each successive decrease in variance by 500,000 is accompanied by increasingly greater decreases in income. Eventually, how-

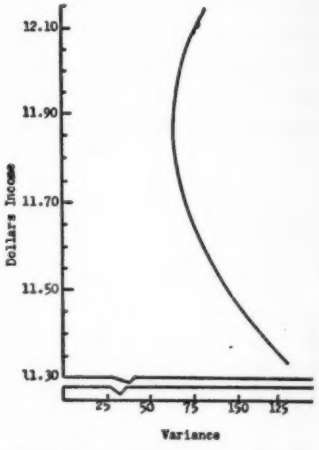
ever, a shift of more acres to milo reduces income but increases variance. With the entire 100 acres in milo, gross income averages $1,016 while variance is 1,885,150. Conversely, starting with 100 acres of milo, a shift of resources to wheat would, over the range indicated, increase income and decrease variance. For small shifts from milo to wheat, year-to-year variations in wheat income offset those from milo. For larger shifts, however, the wheat component of income variance becomes greater and total variance changes accordingly.

Thus, if we look upon "certainty" as a "product" which can be produced by different uses of resources and if it increases as variance decreases,



Corn-Oats Combinations, Iowa Data

FIGURE 4



Wheat-Hay Combinations, Iowa Data

FIGURE 5

then we can say that over a range, money income and certainty are complementary products. A rearrangement of resources to produce more income also results in "production of more certainty" (reduction in variability). Beyond this point, greater certainty can come only at the expense of income. This concept is presented in Figure 3 where we measure "degree of certainty" in an "objective" manner; zero variance is given a score of complete certainty (1.0) while each increase in variance by one million is considered arbitrarily to reduce certainty by .2.

Other possibility combinations include those which are only competitive while some are even linear. Two based on the Iowa data are shown below. (We have not gone to the detail of converting variance to a certainty index as in Figure 3. All combinations of the crops for Colorado include a slight range of complementary.) For oats and corn (Figure 4), the relationship is one of competition alone and a shift of resources to

bring about greater income is always accompanied by an increase in income variance (a decrease in "certainty", our second "product"). For resources used in either wheat or hay production (Figure 5), the range over which income and degree of stability are complementary is fairly great. Sacrifices in income to obtain stability are nowhere as great as for corn and oats, however. (Wheat, soybeans, or hay would generally serve more efficiently than oats for combinations with corn; as compared to oats, a unit-reduction in variance does not require as great a sacrifice in income.)

The simple devices applied above also can be used to measure the sacrifices to the society of consumers as farm producers choose diversification as a means of reducing income variability. Although the steps are not taken here, sacrifices in the value of product for iso-resource quantities can serve this purpose.

Marginal quantities

By applying Equation II from a previous section to our variance data, we obtain the estimates of marginal rates of change in variance as q, the proportion of resources allocated to a specific crop, is changed. These are shown in Table 3 where q refers to the portion of resources allocated

TABLE 3. ESTIMATES OF MARGINAL CHANGES IN VARIANCE FOR TWO LOCATIONS AND THREE COMBINATIONS[a]

q	Marginal Change (in terms of each one-acre shift between crops) in Variance for:		
	Wheat-milo, Kan.[b]	Corn-oats, Iowa	Wheat-hay, Iowa
.9	74	337	159
.8	64	308	132
.7	54	280	104
.6	43	252	78
.5	32	223	50
.4	21	194	23
.3	10	165	−4
.2	−1	137	−32
.1	−11	108	−58

[a] The proportion q refers to 100 acres in the case of wheat and milo and to one acre in the case of corn and oats and wheat and hay.
[b] Variance figures in units of 1000.

to the first product mentioned in each pair. These marginal quantities indicate the rate of change of variance as q takes on different values. When "80 acres are allocated to wheat and 20 are used for milo," shift of "one more acre" to wheat increases variance by 63,818; at a "combination of 90 of wheat and 10 of milo" and shift by "one more acre" adds 74,309 to income variance. In all cases, variance increases at an increasing

absolute rate as q increases in magnitude. The marginal quantity is negative over the complementary range.

Minimizing Variance

From our previous models and data we can indicate the allocative or diversification pattern which will minimize income variance. This is accomplished by setting Equation II above equal to zero, indicating a zero change and hence the minimum attainable variance. This procedure gives rise to Equation III below which allows direct estimation of q and q−1

$$q = \frac{\sigma_B^2 - \rho\sigma_A\sigma_B}{\sigma_A^2 + \sigma_B^2 - 2\rho\sigma_A\sigma_B} . \qquad \text{(III)}$$

As the data in Table 4 indicates, income variance is at a minimum with a .20 proportion of resources devoted to wheat and .80 devoted to milo (20 acres of each 100 to wheat and 80 acres to milo). (The value of q which minimizes income variance corresponds to the vertical or "turning" point on the course of Figures 2, 3 and 5.) For the Iowa corn-oat combination, income variance is at a minimum with the entire acreage devoted to oats but net income per acre is −.12 then. The operator would

TABLE 4. VALUE OF q FOR MINIMIZING INCOME VARIANCE (also minimum variance and corresponding income)

Combination	Value of q[a]	Minimum Variance[b]	Income Corresponding to Minimum Variance[c]
	Kansas Data (gross income and 100 acres)		
Wheat-milo	.20	1,665	1346.40
Wheat-barley	.23	2,564	1830.20
Milo-barley	.68	1,655	1190.48
	Iowa Data (net income and one acre)		
Corn-oats	0	20.70	.12
Corn-wheat	.15	128.19	12.89
Corn-hay	.09	73.64	10.69
Wheat-hay	.32	65.93	11.61

[a] The q value refers to proportion of acreage devoted to the first crop mentioned in the combination. The proportion devoted to the second crop is q−1.

[b] The minimum variance corresponds with the vertical point of possibility curves such as those shown in Figures 2 or 5.

[c] Income for 100 acres of Colorado wheat, milo or barley grown alone is $2668, $1016, and $1580 respectively.

not choose to minimize variance while realizing a loss. In the wheat-hay case, income under minimum variance (.32 of a given acreage to wheat and .68 to hay), is only slightly less than for wheat alone and is greater than for hay alone. (Per acre returns for wheat and hay alone are 12.19 and 11.33 respectively.) Even the 12.89 return under the minimum variance combination for corn and wheat is only moderately less than for the straight-corn return of 16.84 per acre.

Other Considerations

Because of space limitations, only the more elementary details of diversification and variance reduction have been outlined. Other situations can be explained with more complex models. Some of the added considerations should be mentioned, however.

The nature of returns to scale also has some effect on the quantity by which variance will be changed as two enterprises are combined. If we examine only the one equation $\sigma_T^2 = .25\sigma_A^2 + .25\sigma_B^2 + \rho\sigma_A\sigma_B/2$ from above, we also can make statements in this direction. Reduction in variance will be somewhat less than that specified previously if A is produced under conditions of decreasing returns as compared to constant returns scale: diversion of one-half the resources from A to B will reduce output in each production period by less than if the enterprise is produced under constant returns. Increasing returns, as compared to constant returns, will have an opposite effect. Other qualifications also must be made in terms of the nature of returns for enterprise B as well as enterprise A. Also managerial limitations may give rise to some increase in variance as enterprises are added; the entrepreneur may be able to make less efficient decisions as he spreads thinner in obtaining added information and in making more decisions for an increased number of crops or livestock enterprises. In the same direction, enterprise complementarity and interaction may cause variance reduction to fall by somewhat less than under indepedent competitive enterprises.

Relative Variability

While absolute variance serves satisfactorily for some purposes, relative variability is also important in choices involving level of income and instability. Thus, under the assumption set out previously, the coefficient of variation (CV) can be defined in the manner of IV below where I_A, I_B and I_T refer to income from enterprise A, enterprise B and the farm as a total respectively. By working with the square of the coefficient of variation (to facilitate handling) we obtain V which defines marginal changes in the (squared) coefficient of relative variability. From V we can derive VI which defines the value of q which minimizes the relative variability of income

$$CV = \frac{\sigma_T}{I_T} = \frac{\sqrt{q^2\sigma_A^2 + (1-q)\sigma_B^2 + 2pq(1-q)\sigma_A\sigma_B}}{qI_A + (1-q)I_B} \tag{IV}$$

$$\frac{d(CV)^2}{dq} = [qI_A + (1-q)I_B][2q\sigma_A^2 - 2(1-q)\sigma_B^2 + 2\rho(1-2q)\sigma_A\sigma_B \tag{V}$$

$$q = \frac{I_A\sigma_B^2 - \rho I_B\sigma_A\sigma_B}{I_A(\sigma_A^2 + \sigma_B^2) - \rho\sigma_A\sigma_B(I_A + I_B)}. \tag{VI}$$

When applied to time series data, these equations give rise to relationships such as those presented previously except that they now express instability relative to income. The ranges of complementarity and competition between level of income and stability of income also have the implications discussed earlier. Computations have not been made for these statistics because of lack of space.

Our statements refer only to the logic of diversification where variance is a sufficient measure of variability. Other quantities, such as arithmetic differences, may serve better in some cases. Also, autocorrelation is a problem which must be considered in many series and can be discussed later.

CRISIS IN FARM PRODUCTION IN AUSTRALIA

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ALTHOUGH manufacturing industries greatly expanded and grew in importance between the two world wars, the farming industries retained their fundamental position in Australia's economic development. Since farm products comprise between 80 and 90 per cent of total exports, Australia has depended on the progress in the farming industries for the purchase of capital equipment, raw materials, and services from overseas and for the payment of interest on a large external debt. Between 1920 and 1940, there was a great expansion in farm production and an increasing proportion of most farm products was sold overseas (see Table 1). At the same time, the United Kingdom became an even more important market, the proportion of exports marketed there rising from 36 per cent in 1926-27 to 56 per cent in 1938-39.

Nevertheless, the world-wide revolution in farm techniques on the one hand and the apparent slackening of population growth and the rise of economic nationalism on the other, were raising doubts concerning Australia's ability to market overseas an increasing quantity of farm products.[1] These doubts were increased by the effects of the war upon Britain's trading position.

More recently, however, these doubts have been replaced by fears that Australia may not be able to maintain exports at the pre-war level and that this will have a serious effect both upon standards of living and the pace of the country's economic development.

Significance of Decreased Exports

Examination of Table 1 reveals that both the volume of exports and the proportion of production exported were generally less in the post-war period, 1946-47 to 1950-51, than they were in the pre-war period. Meanwhile the proportion of exports marketed in the United Kingdom has fallen, being as low aş 27 per cent in 1945-46 and reaching only 42 per cent at its highest in 1948-49. The decline in exports has been even more severe as indicated recently by the following figures (Table 2). If the present trends continue, exports of beef and veal, mutton, lamb, pig

[1] For a view of this at the time see J. P. Belshaw, *The Future of the Australian Export Industries,* New England University College Bulletin, 1944, and Belshaw, "Markets for Australian Exports," *Far Eastern Survey,* March 14, 1945.

TABLE 1. AUSTRALIAN PRODUCTION AND EXPORT OF PRINCIPAL FARM PRODUCTS

Years	Production	Export	Per Cent Exported	Production	Export	Per Cent Exported
	Wool (greasy basis)—Million Pounds[a]			*Wheat—Million Bushels*		
1920–21 to 1924–25	703	667	95	135	93	69
1925–26 to 1929–30	911	815	90	136	84	62
1930–31 to 1934–35	999	900	90	186	129	70
1935–36 to 1938–39	990	876	88	160	107	67
1946–47 to 1950–51	1,048	1,308	124	186	101	54
	Butter—Million Pounds			*Cheese—Million Pounds*		
1920–21 to 1924–25	250	101	40	27	8	29
1925–26 to 1929–30	280	95	34	30	5	17
1930–31 to 1934–35	417	220	53	36	11	30
1935–36 to 1938–39	429	203	47	51	22	44
1946–47 to 1950–51	363	160	44	97	54	55
	Beef and Veal—Thousand Tons			*Mutton and Lamb—Thousand Tons*		
1921–22 to 1924–25	410	75	18	203	38	19
1925–26 to 1929–30	481	75	17	226	37	16
1930–31 to 1934–35	386	77	20	314	72	23
1935–36 to 1938–39	549	111	20	315	87	28
1946–47 to 1950–51	577	85	15	311	58	18
	Pork—Thousand Tons			*Bacon and Ham—Thousand Tons*		
1921–22 to 1924–25	15	[b]	—	29	.8	2.0
1925–26 to 1929–30	18	—	—	33	.6	2.0
1930–31 to 1934–35	27	4	15	32	.8	2.4
1935–36 to 1938–39	39	13	33	33	.8	2.3
1946–47 to 1950–51	33	7	22	43	3.0	7.0
	Wine—Million Gallons			*Dried Vine Fruits—Thousand Tons*		
1920–21 to 1924–25	12	1	7	31	16	51
1925–26 to 1929–30	18	3	14	54	35	65
1930–31 to 1934–35	15	3	21	65	52	81
1935–36 to 1938–39	18	4	20	76	59	78
1946–47 to 1950–51	32	2	6	61	41	66
	Sugar—Thousand Tons					
1920–21 to 1924–25	301	[b]	—			
1925–26 to 1929–30	504	160	32			
1930–31 to 1934–35	596	258	43			
1935–36 to 1938–39	792	394	50			
1946–47 to 1950–51	792	291	37			

[a] Scoured wool converted into greasy wool by ratio 100:55 (sheep skins and tops excluded), except for last period when figures on greasy basis available.
[b] Net imports.

Source: Calculated from *Commonwealth Statistical Publication.*

TABLE 2. DECLINE IN EXPORTS (THOUSANDS OF TONS)

	Average Five Years Ended 1938–39	1948–49	1949–50	1950–51[a]
Butter	96	90	79	54
Beef and Veal	107	86	81	71
Mutton and Lamb	87	51	86	24
Pork	12	9	7	6
Dried Vine Fruits	58	51	36	34

[a] Subject to revision.

meats, milk products, and some other minor products such as eggs will disappear altogether within a decade.[2]

This has already seriously affected the international reserves of Australia and will cause even worse effects in the future. From June, 1938, to June, 1951, these reserves actually rose from £A56 million to £A843 million as the result of unrequited exports during the war, the lag in imports after the war, capital investment in Australia by British and foreign firms, a large volume of speculative transfer of short-term capital, and the extraordinarily high level of wool prices in the 1950-51 season. Since June, 1951, a drastic change has taken place. The favorable factors have ceased operating. On the other hand, imports have flooded in and the volume of exports has fallen significantly, turning a substantial trade surplus into a substantial deficit. International reserves have fallen by about £A500 millions. This forced a drastic limitation of imports upon the Commonwealth government in March, 1952.

Australia depends upon other countries for a wide range of manufactured articles, raw materials, and services. These needs have been increased since the war because of the high level of money incomes under full employment, the speed with which population is increasing, post-war development of new industries and the expansion of old, increased emphasis given to development, and rearmament. The reduced ability to export, therefore, may quite well reduce standards of living, limit the tempo of industrialization, and hinder development. It has serious implications for the sterling area since it will increase the demand for farm products from hard currency areas. It is also tragic in a hungry world.

It is little wonder, therefore, that the crisis in farm production and the decline in farm exports has become the most serious national problem facing Australia today.

Declining Exports Caused by Many Factors

Decline in exports has been the result of increased consumption of foodstuffs at home and the slow rate of farm production expansion.

The increase in domestic consumption of foodstuffs has resulted from a rapid increase in population and from a higher per capita consumption. The acceleration of population growth has been due to a higher rate of natural increase and an ambitious migration program. Population grew from 6.9 million in 1938-39 to 8.1 million in June, 1951. The population growth in 1950-51 was at the unusually high rate of 3.2 per cent. At the same time, full employment and the redistribution of income through social security have led to an increased food consumption per head. Be-

[2] *Quarterly Review of Agricultural Economics,* Bureau of Agricultural Economics, Canberra, A.C.T., 1948; T. H. Strong, *Australian Financial Review,* December 20, 1951.

tween 1936-37, 1938-39, and 1949-50 the consumption per head of milk products (excluding butter), for example, rose from 39 to 49 pounds, sugar from 112 pounds to 124 pounds, dried vine fruits from 16 to 26 pounds, and grain products from 204 pounds to 213 pounds. It is true the per capita consumption of both meat and butter fell, but the total consumption of meat increased while there were difficulties over the supply of butter.

On the other hand, production has been rising very slowly at a rate which has been less than one per cent per annum. In some cases—butter,

TABLE 3. PRODUCTION OF AUSTRALIAN FARM PRODUCTS 1938-39 AND POST-WAR YEARS

	1938-39	1946-47	1947-48	1948-49	1949-50	1950-51[a]
Wool, greasy, million lbs.	984	977	973	1,031	1,110	1,150
Wheat, million bushels	155	117	220	191	218	184
Butter, million lbs.	456	321	363	371	389	370
Cheese, million lbs.	66	95	93	97	100	100
Processed milk, thousand tons	30[b]	80	92	99	112	104
Total milk, million gals.	1,150[b]	1,080	1,173	1,213	1,242	1,200
Beef and Veal, thousand tons	559	488	562	577	607	652
Mutton and Lamb, thousand tons	320	303	295	320	358	277
Pork, thousand tons	39	30	27	37	35	34
Bacon and Ham, thousand tons	33	48	46	42	41	37
Sugar, thousand tons	929	552	605	943	937	921
Wine, million gals.	15	33	34	34	33	28
Dried Vine Fruits, thousand tons	75	56	81	56	57	55
Grain Oats, million bushels	17[b]	16	41	24	27	25
Maize, million bushels	7[b]	6	6	5	6	5
Rice, million bushels	2.3[b]	3	2.7	2.7	3.8	3.3
Hay, million tons	3.5[b]	2.4	3	2.3	2.4	2.1
Potatoes, thousand tons	338[b]	544	498	460	471	—
Peanuts, million lbs.	13[b]	57	36	22	18	12
Tobacco, dried leaf, million lbs.	5[b]	4	2.5	3.4	4.1	4.2
Cotton, unginned, million lbs.	19[b]	3	2.1	1.8	0.7	1.1

[a] Subject to revision.
[b] Average 5 years ended 1938-39.
Source: *Quarterly Reviews of Agricultural Economics.*

mutton, lamb, pork, and dried vine fruits—production has been at a lower level than before the war, while the production of sugar has remained about the same. There were, however, increases in wool, wheat, cheese, beef and veal, bacon and ham, and wine (see Tables 1 and 3), but on a per capita basis increases were recorded only for wheat, cheese, bacon and ham, and wine. Three of these increases were obtained, in part at least, through decreases in butter, pork, and dried vine fruits. This leaves only wheat where increases in production have been largely due to favorable seasons, acreages having been up to 30 per cent less than in the pre-war period.

The slow rate of expansion in over-all farm production has meant not

only that exports have declined but also that the high level of home consumption has sometimes been difficult to maintain. At times, particularly in New South Wales during the winter months, butter and whole milk have been in short supply, while periodic shortages also have existed in mutton, lamb, eggs, potatoes, and other commodities.

Production difficulties have been caused by a number of general factors which have affected some farm industries more severely than others.

In Australia, as in other countries, there has been a migration from rural areas as productivity has risen and the amenities of city life and opportunities for advancement there have improved over those available in country areas. Nevertheless, actual numbers employed in agriculture increased up to the war, reaching a peak of 522,000 in June, 1939. During and since the war there has been a net loss of about 60,000 workers.[3] This has been felt most severely by wheat growers and least by the graziers.

Of much greater importance has been the critical shortages of such essential commodities as fencing wire, tractors, agricultural implements, and machinery of all kinds.[4] These shortages would have been serious in any period. But they are a national tragedy at a time when more production is needed and when the net incomes of farm producers is at an all-time peak.[5] Superphosphate, so essential for Australian wheat lands

[3] *Monthly Summary of Australian Conditions,* National Bank of Australasia, June, 1949, p. 3. Since there has been some over-all increase in farm production this, of course, has meant an increase in the output per man employed. It has been calculated, for example, that the per capita output of farm production increased by 25 per cent from 1938-39 to 1947-48. This, perhaps, overstates the increase, since 1947-48 was the year of the record wheat harvest due to specially favorable weather (for the calculations of productivity see *Quarterly Review of Agricultural Economics,* October, 1949).

[4] J. G. Crawford, *The Economics of Conservation,* Bureau of Agricultural Economics, 1952, Appendix 11.

[5] "It is, in my opinion, one of the real agricultural tragedies in Australian history that since the war the farming community has not been able to exploit its financial strength in the interests of soil improvement and land development. Over the last ten years American agriculture has been characterized by very marked advances in productivity. These have been based on adequate supplies of labor, material (including fertilizers) and equipment with which to carry out improved techniques of production. Australian agriculture has been less fortunate, finding it difficult to repair the shortages accumulated during the war years, let alone make the advance which is its due in the light of the much improved 'state of the arts'." (Crawford, p. 29.) "We are starting out on a serious handicap in the form of a great backlog of deferred maintenance throughout our rural industries. To anyone travelling the main agricultural and pastoral areas of Australia with his eyes open, one of the most striking features is the comparative lack of the essential replacement of fencing and farm building that has been evident in the last decade or so, not to mention the very limited amount of new construction, including accommodation, that has been undertaken in key rural centres as well as on farms. This is an extremely serious situation following as it does, a sustained so called 'boom' for primary products. In the battle for key resources in a difficult post-war period, the rural sector appears to have fared badly." (T. H. Strong, *Quarterly Review of Agricultural Economics,* January 1952, p. 3.)

and necessary also for pasture improvement, has been in short supply. This is largely due to an acute world sulphur shortage, and felt in Australia in the form of an annual deficiency of about 40 per cent.

National income per head increased from a base of 100 in 1938-39 to 329 in 1950-51. During the same period net farm incomes increased eighteen-fold. It is possible that higher farm incomes combined with high marginal rates of taxation have resulted in decreased effort. But not all farm industries have shared equally in this prosperity. The increase has been greatest in wool where extraordinarily high prices have inflated incomes generally. Wheat farmers also have been prosperous though much less so than the graziers. On the other hand, the real income of producers of butter, sugar, and dried vine fruits have increased very little. The variation in farm income levels has been due to some extent, to different marketing arrangements. Wool is the only major product sold today on a free market. Wheat is subject to an international agreement, dairy products, sugar, meat, eggs, and dried fruit are sold to the United Kingdom on long-term contract while some other products, such as apples and honey, are sold on annually negotiated contracts with the British Ministry of Food. In most cases the contract price is below the free market price. Usually too, a home consumption price is fixed which has, in the post-war period, been sometimes less than the export price, although the home consumption price may be subsidized by the federal government.[6]

These relative differences in farm incomes have had important effects. Wheat farmers especially have reduced wheat acreages and increased the number of sheep carried, although in this industry decisions have been influenced at least as much by shortages of key implements. According to

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[6] The return to the wheat farmer, for example, is determined by a home consumption price (subsidized during the 1949-50 season) fixed annually on the ascertained cost of production and an export price determined by the quota sold under the International Wheat Agreement and the excess over the quota sold on the free market. The return to the Australian wheat grower has therefore been well below the return to overseas producers and would be reduced by any fall in the proportion sold on the free export market. Dairy products, the third important export, have been sold under somewhat similar conditions. Returns to the butter and cheese producer are determined by the level of the home consumption price and a rate of subsidy paid by the Commonwealth Government (both determined after an annual investigation of costs), and by the contract price with the United Kingdom. The price of whole milk for local consumption is fixed by the appropriate state authorities from time to time. On the other hand, processed milk products are sold on a free export market.

Australia's quota under the wheat agreement is 88.7 million bushels. In 1951 exports of Australian wheat (and flour as wheat equivalent) amounted to 126.6 million bushels. It is unlikely, however, that Australia will have sufficient export wheat during the current season to fill her quota.

The export of wheat has also been subject to a tax of 50 per cent of the amount by which the average price for all wheat exported exceeded the guaranteed price with a maximum tax of 2s.2d. per bushel. The proceeds were paid into a Wheat Stabilisation Fund.

the Commonwealth Statistician, for example, there are actually fewer harvesters and plows on Australian farms now than in 1943 and these machines are probably in worse condition.[7] High wool prices also have encouraged the withholding of sheep from slaughter and led to a fall in the production of mutton and lamb.

Wool prices have been higher relative to the prices of milk products than they have to wheat prices and although there has been some substitution of sheep for cows, most dairying districts are not considered suitable for sheep. There also has been some substitution of beef cattle for dairy cows. Most dairy farms are family farms employing little labor. In the case of those requiring labor, the long hours and poor amenities have made it difficult for farmers to retain these workers. As a result, the number of dairy cows has fallen from 2.6 million in 1938-39 to 2.3 million today. Fortunately, production per cow has increased sufficiently to maintain the output of milk at pre-war levels, though this is inadequate for a population that is 18 per cent greater and has a higher per capita consumption.

There have been significant changes in the utilization of milk. The proportion used for cheese-making has increased from 5.5 per cent to 7.8 per cent, that for processed milk products from 2.8 per cent to 6.9 per cent, and that for whole milk consumption from 13.9 per cent to 20.1 per cent. As a result, the proportion used for butter has dropped from 78 to 65 per cent, leading to butter scarcity both for home consumption and export. The changed utilization for milk has resulted from a better appreciation of the value of fluid milk consumption, higher incomes, better returns for whole milk than for butter, and the sale of processed milk exports on a free market instead of by contract.

The decline in exports has therefore, been due to an increase in per capita consumption, a high rate of population growth, and a low rate of production increase. There have been many causes of the slow growth of production. Possibly the high level of some rival incomes has reduced effort. Changes in relative incomes appear to have been partly responsible for the reduction in wheat acreages and the decline in the production of mutton and lamb. It is possible that the latter may increase in proportion with the greater sheep numbers now that lower wool prices have reduced the incentive to change. The failure of whole milk production appears to be due to the relatively low income of the dairy farmer and to scarcity of labor. The most important single cause of the production lag, however, has been the short supply of essential capital equipment and of superphosphates.

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[7] The author is indebted for this point to T. H. Strong, Director, Bureau of Agricultural Economics.

Means of Increasing Agricultural Production

An expansion in the amount of farm products available for export can be achieved by increases in production, reductions in consumption, or by a combination of both.

Production can be expanded by bringing new lands into use or by increasing production on land already in use.

The frontiers of settlement were reached long ago, however, and there has been some retreat from marginal areas. It is still probable there will be some expansion in settlement through the removal of trace element deficiencies in large areas of land in South Australia and elsewhere; development of the cattle industry in Northern Australia by railway extensions, aerial transport of carcass meat, provision of more water supplies and better station management; expansion of irrigation following the Snowy Mountains development; and through the further study of homoclimes.

Despite the importance of these possibilities, it is probable that the greatest increases in farm production will come from the areas already being farmed.

Price increases as a measure to meet the crisis have been recently advocated by Colin Clark, by the Premier and the Minister for Agriculture in New South Wales, and by producers' organizations. Colin Clark, as well as urging price increases as a measure to encourage production, also has advocated them as a method for reducing home consumption. He has pointed to the high per capita consumption of meat in Australia as an indication that reductions in consumption would not be harmful. He might have pointed equally, however, to an inadequate consumption of some protective foods as showing the need for an increase in consumption, or, at least, an alteration in its composition. Nevertheless, any price increases to encourage expanded production will have the effect of reducing home consumption.

An increase in the price which the producer obtains for his products may be the result of an increase in the export price or in the home consumption price. There have been frequent complaints from producers' organizations and others that the contract prices with the United Kingdom are lower than would exist on a free market and less than producers in other countries are obtaining. Pressure certainly will be brought upon the United Kingdom for higher prices. Australian wheat growers also are asking for higher maximum prices under the International Wheat Agreement. An increase in the home consumption price of farm products will have the disadvantage that it will immediately add to cost inflation through the quarterly adjustments in the basic wage in accordance with movements in the cost of living. This could be avoided by an increase in subsidies but the Australian Government is unlikely to adopt this policy.

Nevertheless, increases in the domestic price of wheat, dairy products, and some other farm products, seem inescapable, in addition to those allowed because of cost increases.

Some have advocated a lower rate of taxation on farmer incomes but such a concession is unlikely for political reasons. A tax policy more directly linked with production and efficiency has recently been adopted. This allows very generous and special tax concessions for a wide range of capital expenditure by farmers.[8] Such concessions, however, would be of little benefit if the capital equipment were not available in adequate supply. This remains the case as far as farming is concerned. Capital equipment may be obtained either from overseas or be produced by Australian manufacturers. Overseas purchases are clearly limited by the size of the international reserves and export incomes, though funds may be freed by severe reductions in other classes of imports. Overseas funds may be increased by a second loan from the International Bank or by raising dollar loans in New York.

A large expansion in the production at home of capital equipment for the farm industries is possible. But, in the post-war period, expansion in the industries manufacturing farm machinery, etc., has been hindered by high consumption, private investment demands, development programs, rearmament, and by bottlenecks in steel and power. A system of priorities over capital funds and raw materials to ensure adequate production is desirable. The machinery for establishing priorities already exists—and has already been used—in the National Security Resources Board, the Capital Issues Board, and the selection allocation of bank credit under the direction of the Commonwealth Bank. One industry in which expansion has become specially urgent is the production of superphosphate and, since imported sulphur is likely to remain scarce, local plants are being converted to the use of pyrites. A considerable reorientation of government development policies towards the improvement of transport facilities in rural areas, conservation works, the provision of additional supplies of water and so on, are a necessary part of any plan.

Although the movement from farm to urban occupations is both inevitable and desirable as farm efficiency improves, the drift, especially since 1938, appears to have gone too far. Between 1933 and 1947, more than half the regions into which the various states are divided lost popu-

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[8] Under legislation repealed last year there was a general allowance in the first year on the purchase of capital equipment of 40 per cent with subsequent allowances of 2.5 per cent of the depreciated value. A similar concession has been re-introduced for farmers. Depreciation will now be allowed of 20 per cent of the capital cost a year for five years allowing a full writing off of the capital cost over the short period of five years. For a taxpayer paying 10 shillings in the £1 this means a tax concession of half the cost of investment in five years.

lation, some seriously. In four of the six states of Australia, the capital cities contain half of the state's population; in the whole of the Commonwealth there are, excluding the state capitals, only 11 towns with a population in excess of 20,000. Because of her climate and other natural factors, Australia must always remain a country of relatively sparse rural population and of small country towns. There would be few Australians, however, willing to accept the quickened shift of recent years as either inevitable or desirable.

An effective policy to limit the drift to the city must contain several elements. First, the great disparity between wages, hours of work, and working conditions in rural and urban industries must continue to narrow, although any increase in labor costs will be reflected in farm costs and will require compensation by higher farm prices. Second, amenities in rural towns and rural areas are still much below those of the city and need improvement if the flow to the capital cities is to be limited. Thirdly, any decentralization of industry to add to urban employment opportunities in rural areas and to the population of country towns is unlikely to develop without active government support. Finally, educational systems throughout Australia retain their almost complete urban bias and are woefully deficient in their teaching of rural subjects. Teaching of agriculture is confined to a very few agricultural high schools and colleges and to the universities. Neither state nor federal governments have yet sufficiently appreciated the urgent need for improved rural education facilities.

Additional capital equipment and labor would not be fully effective without a change in techniques and practices on many farms. Technology has been changing very slowly and, in some cases, farming has been exploitative and inefficient. This could be illustrated by the slow increase in wheat yields in Australia, the very short rotations on many wheat farms, the decline in stock numbers on the inland pastural areas, the destruction by rabbits of pastures perhaps capable of carrying an additional 40 million sheep, the slow introduction of improved pastures, the prevalence of over-stocking, and the serious soil erosion that is often obvious.[9] Doubtless, these problems have often arisen because the environment has not been sufficiently understood nor the knowledge available to indicate the variations in technique that are desirable as natural conditions change from locality to locality. This knowledge can only come quickly through an expansion of the research programs of the Commonwealth Scientific and Industrial Research Organization, the state departments of agriculture, and the universities.

But even without additional information, a great expansion would be

[9] J. G. Crawford, *The Economics of Conservation*, Bureau of Agricultural Economics, 1952. See also *Third Report of Rural Reconstruction Commission*.

possible if existing knowledge were effectively applied. Unfortunately, extension services in all Australian states are on a small scale. In New South Wales, for example, while the extension officers are generally well-qualified, respected, and competent, there is only one agronomist, on the average, to each 4,000 properties and extension officers as well are forced to devote a considerable proportion of their time to administrative and regulatory duties. A several-fold expansion of the Extension Service is needed, but this alone might not be enough.[10] Extension officers do not have the power to enforce the adoption of better techniques, nor is it desirable that they should exercise such power. But as a final resort, it might be necessary to exercise powers similar to those used in England during the war and to keep in reserve the right to acquire compulsorily those properties where the standard of farming is very low. Needless to say, Australians, particularly those on the land, are unlikely to accept such a policy, even in the national interest, without considerable educational work and leadership from the rural interests themselves.

Summary

The difficulty in maintaining a large flow of agricultural exports has become obvious with a dramatic suddenness and it is a crisis that has to be faced immediately. Hence, there is a need for simple expedients such as price increases and concessions on capital expenditure. These are not enough, however, since the crisis has arisen from basic changes in the economy, such as higher rates of consumption and population increase, which require a greater rate of production expansion over a long period of time if exports are to be maintained. For that reason, a program to raise production will need to be extensive, many-sided. It will require a national effort more comparable in its magnitude to problems of war than of peace.

Although it is unlikely that Britain will purchase as large a proportion of Australian exports as before the war, the overseas prospects are brighter than they appeared to be in 1945. Since the end of the war, programs administering to the needs of a hungry world have been developed. The International Bank, the Food and Agriculture Organization, the Technical Assistance Programs of the United Nations, the Point IV Program, the

[10] "Unfortunately, past experience has shown that while many dairy farms receive a guaranteed return for whatever they produce, they are not obliged to expend labor and capital on improving their farms so as to obtain the greatest possible return all the year round. Despite the efforts of state agriculture departments very little progress has been made in such matters as pasture improvement, fodder conservation, herd recording and breeding for production. Admittedly, labor and materials have been scarce, but available resources are capable of being more fully utilized and efficiency greatly increased on many dairy farms." (*Review of the Bank of New South Wales*, August, 1951) What is said here of the dairying industry could probably also be said of many other rural industries.

Colombo Plan, and other programs suggest that the countries in need of greater food imports are likely to be able to purchase them in greater quantities than before the war. Moreover, as pointed out by the present director of the Commonwealth Bureau of Agricultural Economics, the difficulty of buying goods from the hard currency countries provides Australia with a golden opportunity for expansion in exports. The world, in short, needs more food.

Australia is faced both with a crisis and an opportunity. The failure to solve the one and seize the other might well reduce standards of living within Australia and hinder economic progress for a generation.

HOW ACCURATE IS OUTLOOK?

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FOR many years the Bureau of Agricultural Economics of the United States Department of Agriculture and private organizations have attempted to help farmers and businessmen by making forecasts of general and specific economic conditions. How accurate have federal economic forecasts been, and is any skill shown in forecasting? These are the questions considered in this paper.[1] The question of the use made of forecasts is not considered. No attempt was made to appraise all forecasting done by the BAE; only certain selected areas were evaluated.

Method Used

In the evaluation, each series of forecasts was divided into three groups: decreases, no change or stability, and increases. Values ranging from 0 to 100 were assigned, rating the accuracy of the forecast depending upon the actual outcome. These values were arranged in such a manner that over a long period of time a score of 50 would theoretically be obtained by guessing whether the actual changes were all increases, decreases, stabilities or a combination of these. For example, a forecast of an increase received a score of 100 if the outcome was an increase, 50 if it was a stability, and zero if the outcome was a decrease. Forecasts of stability received a score of 100 if the outcome was a stability, and 25 if the outcome was either an increase or a decrease.

TABLE 1. VALUES ASSIGNED TO VARIOUS FORECASTS ACCORDING TO THE ACTUAL CHANGES THAT OCCURRED

Direction of Forecast	Actual Change		
	Decrease	Stability	Increase
	Value	Value	Value
Decrease	100	50	0
Stability	25	100	25
Increase	0	50	100

Determinations of the limits for designating changes as decreases, stabilities, and increases were made for each time pattern (average for a few

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[1] This paper is a digest of a doctoral dissertation by John D. Baker, Jr., at Purdue University, under the supervision of Don Paarlberg. The cooperation of the Bureau of Agricultural Economics is acknowledged. A more technical treatment of this thesis is being submitted to *Agricultural Economics Research*. The work is otherwise unpublished.

months, a few weeks or for a year) in each series. This determination was made from an array of the actual per cent changes from one period to the next taking place in the series data over the time under consideration. The array of per cent changes was divided into the three categories by selecting one-third of the observations about the point of zero change so that the limits in both directions were nearest being the same. The limits were then equated by interpolation to the nearest figure which would include one-third of the observations. Actual changes which fell within these limits were called "stabilities," changes above the upper limit were "increases" and changes below the lower limit were "decreases." Thus, the classification is one which is relative to the variability in each series.

Forecasts and data used for checking forecasts were taken from various governmental statistical and situation reports which have been published over the period covered by the study. In order to make the evaluation as objective as possible, rules or guides were established for choosing and classifying forecasts as to series, length, and direction.

Establishing rules and classifying forecasts were not as simple as might first be supposed. For example, there might be a question as to whether an outlook should be checked by the Index of Industrial Production or one of the National Income series. Sometimes the kind of quotation was not clear. It was often not specified whether the forecast was meant to refer to an average for a whole year, an average for a few months or the figure for a single month or year. Even when these were clear, it was sometimes difficult to determine the number of months of time ahead to which the forecast was meant to apply. Oftentimes questions of terminology made the direction of forecasts vague.

Finally, this all-important question had to be answered: Did the series actually do what was predicted?

Forecasts of the General Economic Situation

Forecasts of the general economic situation are of importance, not only for the planning of entrepreneurs, but for obtaining more accurate forecasts for individual commodities. If there is an error in a forecast of the general framework and this forecast is used in making predictions for individual commodities, then the error will be carried into these forecasts. The results of the study showed this to be the case. Accuracy of annual average forecasts for Wheat Prices, Farm Income, and Prices Received by Farmers was much higher in the years when Demand forecasting accuracy was above average than in the years when it was below average.

The accuracy evaluation score for 631 general economic forecasts in four major economic series was 75. This compares with a score of zero if predictions were completely wrong, a score of 50 expected over time purely from guessing, and score of 100 if forecasts were perfect. Price

forecasting accuracy was found to be much lower than accuracy in series partly or largely outside the price field. Forecasts of Prices Received by Farmers had a score of 60 while the other three series, Industrial Production, Demand and Farm Income, all had scores of 77 and 78.

About two-thirds of the forecasts were predictions of averages for a few months, about one-fourth were of annual averages for the current or

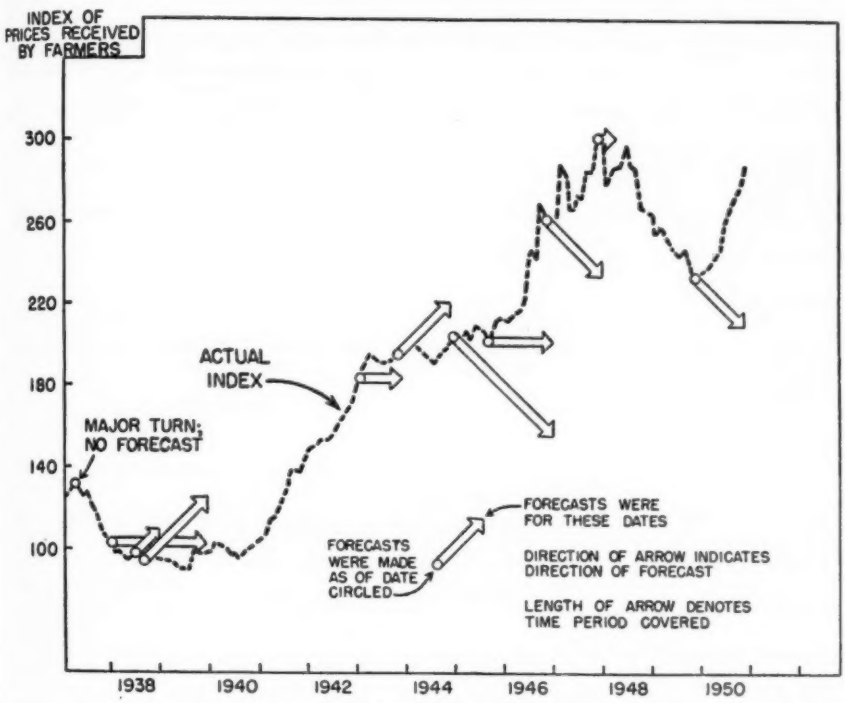

Figure 1. Forecasts Made by the U.S.D.A. of Major Turns in the Index of Prices Received by Farmers, Compared with Actual Index, 1937-1950.

coming year and eight per cent were forecasts of about three month averages which were to be compared with corresponding periods in previous years. Forecasts of annual averages had a slightly higher score than for monthly predictions and were appreciably higher in some series (Table 2). This indicates that averages for shorter periods of time such as for a few months were more difficult to forecast directionally than an average for a year. However, the absolute magnitude of the error was less for the predictions of shorter averages than for the forecasts of averages over longer periods. Large changes do not ordinarily occur in a few months' time. The likelihood of successfully predicting a directional change was greater for the forecasts averaged over longer periods; the likelihood of a

prediction close to the actual level of the variable was greater for short time averages.

Over the 28-year period covered by this study, the accuracy of forecasting varied considerably (Table 3). For example, in Industrial Production accuracy was low in 1929-36 (score, 46) and in 1946-50 (score, 69) when conditions were variable and uncertain.

TABLE 2. FORECAST EVALUATION SCORES FOR VARIOUS GENERAL ECONOMIC SERIES IN TOTAL AND ACCORDING TO TIME PATTERNS, 1923–50[a]

Series	Time Pattern Group			All Groups Combined
	Months	Years	Corresponding Quarters	
	Score	Score	Score	Score
Industrial Production	75	90		77
Demand	77	77		77
Farm Income	74	79	82	78
Prices Received by Farmers	57	66		60
All Series Combined	73	78	82	75
Average Per Cent Error[b]	2.5	10.8	6.8	

[a] The Industrial Production series covers the period 1923–50 while the others extend from 1937–50.
[b] Signs disregarded.

TABLE 3. ACCURACY OF VARIOUS GENERAL ECONOMIC FORECASTS SERIES ACCORDING TO TIME PERIOD, 1923–50

Series	Years				
	1923–28	1929–36	1937–40	1941–45	1946–50
	Score	Score	Score	Score	Score
Industrial Production	71	46	84	78	71
Demand			79	79	71
Farm Income			81	79	75
Prices Received by Farmers			47	66	40
All Series Combined	71	46	78	76	69

There appears to be a natural tendency to do more forecasting when predicting is easier and more certain. This conclusion was supported by comparing the scores in years of low forecasting rate (score, 68) with those in years of high forecasting rate (score, 78). This is not intended as a criticism of forecasters. It is probably wise to be less definite and to forecast less frequently when circumstances are such that trustworthy forecasts cannot be made. Holding silence during periods of excessive uncertainty would minimize farmers' errors in resource allocation and would

maintain a better opinion of the prediction work among forecast consumers.

Long Term and Short Term Forecasts

Length of forecasts is another important consideration. It should not be confused with time-patterns (averages for a few months, annual averages, corresponding quarters), which are generally the different lengths of averages which are being forecasted. Length refers to the period intervening between the time the outlook was made and what might be considered to be the completion of the event. Two classifications were made, short-term and long-term. The dividing line between these two varied

Table 4. Accuracy of Short and Long-Term General Economic Forecasts in Various Time Pattern Groups and Series, 1923–1950[a]

Time Pattern and Series	Short-term[b]	Long-term[c]
	Score	Score
Time Pattern		
Months	72	72
Annual Averages	87	69
Corresponding Quarters	85	78
Series		
Industrial Production	75	77
Demand	77	77
Farm Income	81	72
Prices Received by Farmers	69	49
All Series Combined	78	72

[a] Corresponding quarters, annual averages and all series other than Industrial Production extend from 1937–50.
[b] Monthly forecasts of three months or less in length and annual forecasts made after December 31.
[c] Monthly forecasts of more than three months in length and annual forecasts made before January 1.

between time-pattern groups. The attempt was made to divide the time pattern groups and series fairly equally between short and long-term forecasts for comparison.

Long-term monthly forecasts were all those over three months in length. With this division, 44 per cent of the monthly forecasts were classified as short-term.

In terms of absolute errors, the short-term outlooks were better, as the various series did not fluctuate markedly in the short run. The cumulative and persistent nature of changes in the variables permitted larger absolute errors for the long forecasts. However, using the accuracy evaluation score, which takes account of the relative degree of variation, no difference was found between the accuracy of short (three months or less) and long-term (over three months) monthly forecasts (Table 4). This means that forecasters have not been able to predict directional fluctua-

tions of one to three months in length any better than those made more than three months before the event.

Those series which had the low long-term accuracy were in the agricultural sector. Both Farm Income and Prices Received by Farmers had an accuracy score 13 points lower for long-term than for short-term.

Definiteness and Accuracy

Forecast statements were made with different degrees of definiteness or clarity. The four classifications were: unacceptable, acceptable, definite, and specific. Definitely stated monthly forecasts of the general economic situation were found to be only slightly more accurate than monthly forecasts which were vaguely stated. The scores were:

Unacceptable,	68
Acceptable,	70
Definite,	72

The comparison here was between only three of the four classes for definiteness since there were not enough specific monthly forecasts for making any conclusions.

Among the annual averages, especially in the Farm Income series, were many forecasts of specific figures, which were the most definite statements possible. The accuracy for these specific forecasts was considerably better than for non-specific predictions. Apparently there is a tendency for forecasts which are certain enough to be stated specifically to be more accurate than others.

Average algebraic errors showed that specific forecasts were practically all too high and that the magnitude of error was often considerable:

Time Pattern	*Algebraic Average Error*
Annual averages	+10.0 per cent
Corresponding quarters	+ 3.8 per cent
Monthly	+ 1.2 per cent

Greater success and certainty were in evidence in forecasting Farm Income than in any other series. More predictions of specific figures were made for this series than for the others, and the score was consistently high for all time pattern groups, varying between 74 and 82. This series had the largest proportion of annual averages of any series and contained all the predictions which were classed as corresponding quarters.

Direction of Forecast and Accuracy

Distribution of forecasts and accuracy among the three possible directional groups (decreases, stabilities and increases) were found to vary

widely. The period 1937-50 was largely a time of increase for most series. A reasonable correspondence was noted when comparison was made of the percentage of monthly forecasts made in each direction with the per cent of the months the trend was in each of the directions. On this evidence, it would be difficult to say whether there was a leaning towards optimism or pessimism in forecasting the general economic situation. Demand was the least optimistic of any annual series. As to accuracy, forecasts of decreases were least accurate with a score of 52 while the increases had a score of 89. Stabilities had a score of 66.

No evidence was found in this study indicating that forecasters had relied heavily on projecting short-time trends to make predictions, nor was forecasting more optimistic in election years than at other times.

Federal forecasting has not developed to such a point that a consistently accurate job can be accomplished year after year. Large variations in accuracy and skill occurred each year during the study. In 1948 the accuracy of six forecasts of Industrial Production was about 90, while in 1949 the accuracy dropped to around 60 for nine. Demand in 1946 had an accuracy of 84 and in 1947, with only four forecasts, dropped to a low of 25. The over-all yearly score for Farm Income was more consistent than other series in recent years, but Prices Received by Farmers had great variation in an already low series.

Accuracy of Forecasts of Major Economic Changes

Certain changes in the course of economic events are more crucial and are of greater importance than others. The break from conditions of prosperity to conditions of decline is of major importance and has great influence on the conduct and success of various business ventures. Similarly, determining the end of a decline and prospects for either stable or improving conditions is important to entrepreneurs in making decisions.

These crucial points or major economic changes have been taken to mean a change of sustained length in a series. They were determined in a preliminary form by inspection from a chart of monthly quotations for the series under consideration. They also were checked by the total per cent change between turning points and also the per cent change per month. According to the total per cent change, there was no case used in the calculation of turning point scores in which the amount of increase or decrease after the turn was less than 10 per cent, nor was the change more than 10 per cent for any stable period. After the total per cent change between turning points was calculated, it was divided by the number of months giving a per cent change per month which could be compared with the limits used in the evaluation score to determine whether a change was an increase, decrease, or stability. For example, the limits for Industrial Production were $\pm$ 1.1 percentage points per month. Rates of change

of over + 1.1 would be increases; of less than − 1.1., decreases. Between ± 1.1 would be no change.

To fix the exact turning point, the peak or low month was chosen, but the periods of stability or no change required a more arbitrary evaluation of the data.[2]

One specific forecast which was representative of all relevant forecasts made was chosen for evaluation. Forecasts clearly referring to major turns which did not materialize also were evaluated.

The turning points of three series, Industrial Production, Demand, and Prices Received by Farmers have been evaluated. Perhaps the outstanding fact in this evaluation was the low score for accuracy obtained in all

TABLE 5. MAJOR TURNS IN PRICES RECEIVED BY FARMERS AND THE SCORES OF THE FORECASTS OF THESE TURNS, 1937–50[a]

Date of High or Low Point or Point of Turn	Direction of Turn	Date of Forecast Applied	Direction of Forecast Applied	Evaluation Score
Apr. 1937	Down			
May 1938	Stable	Feb. 1938	Stable	100
No turn	Stable	Aug. 1938	Up	50
Aug. 1939	Up	Nov. 1938	Up	100
Apr. 1943	Stable	Feb. 1943	Stable	100
No turn	Stable	Nov. 1943	Up	50
No turn	Stable	Jan. 1945	Down	50
Sept. 1945	Up	Sept. 1945	Stable	25
No turn	Up	Nov. 1946	Down	0
Jan. 1948	Down	Dec. 1947	Stable	25
Dec. 1949	Up	Dec. 1949	Down	0
			Total	500

$\frac{500}{10} = 50 = \text{score}$

[a] All forecasts were taken from the *Agricultural Situation*.

cases. The accuracy level varied between 48 and 50 for all series. Undoubtedly, the naming of major turning points is the most important and the most difficult phase of forecasting.

Prices Received by Farmers is used here as an example of the method used in this evaluation. Forecasting of Prices Received by Farmers did

[2] The method of determining turning points for the purposes of this study should be recognized as an over-simplification of the actual problem involved. Burns and Mitchell of the National Bureau of Economic Research have been working on business cycles and turning points for years and find it a complicated problem which cannot always be answered with precision. Turning points determined in other studies do not fit the requirements here. The method described was felt to be adequate for the needs. See Arthur F. Burns, and Wesley C. Mitchell, *Measuring Business Cycles*, New York: National Bureau of Economic Research, 1946.

not really start in any volume until 1938. Since 1937 there were six major turns, all of which could be checked against forecasts (Figure 1). Four predictions were made of major changes which did not occur (Table 5). In the 1938-50 period, the evaluation score was 50.

Wheat Forecasts

The accuracy of wheat price, production, and carry-over forecasts together was 76. Wheat price forecasts had an accuracy level of 69. As was true for the more general forecasts, directional predictions of an average for a year were more accurate than the average for shorter periods of time. Measured by the accuracy evaluation score, predictions for longer times into the future were more accurate than for those of shorter duration, which was different from the situation for general forecasts. Distant forecasts had a larger absolute error, however, than did the shorter time predictions. Price forecasting accuracy was low during periods of recession but generally improved over the period of the study.

All series of production forecasts had a downward bias, that is, the forecasts were generally too low:

	Evaluation Score	*Algebraic Error*
Acreage to be seeded	75	−2.9 per cent
Winter wheat production	78	−4.8 per cent
Spring wheat production	80	−1.3 per cent

Improvement in forecasting accuracy was not shown over time. Real improvement in winter and spring wheat production prophesies did not generally occur until June or after.

Skill in Forecasting

Skill was another aspect of the problem. Skill depends upon the degree of accuracy attained in the light of the difficulty involved. A score for accuracy may have little meaning as a measure of skill since a high degree of accuracy may occur because the forecasting job was easy. Thus, one might obtain a high score as a weather prophet simply by predicting fair weather every day. Similarly, a low score for accuracy does not always mean a lack of skill. Lack of data, changing economic climate, or poor conformity to expected economic guides may make forecasting work difficult. Some basis of comparison which considers the difficulty in forecasting must be used if any measure of skill is to be determined.

In this study, a short-time trend line (past three months for monthly forecasts and past two years for yearly averages) was used to make predictions which were then scored and compared with the accuracy evaluation score. The difference between the two scores was taken as a measure of skill.

For this skill score, the assumption was made that the short time trend score was indicative of the difficulty of forecasting. When conditions were variable and changes were occurring frequently, the trend predictions gave a low score. It is assumed that such conditions were more difficult for the forecasters to analyze and would normally result in a decline in their score for accuracy. In other words, a decline in the over-all score may not mean a decrease in skill but an increase in the difficulty of forecasting. If the forecaster is able to anticipate and predict some of these changes, the score for skill would be higher under these more uncertain conditions.

The score for skill for all forecasts of the general economic situation was seven. This means the forecaster obtained an accuracy score seven points better than they would have obtained had they used some extension of a simple trend line as the basis of forecasting. The results may be shown as follows:

Score theoretically obtained by guessing	50
Score obtained by projecting trend	68
Score actually obtained	75
Skill score (75−68)	7

Two conclusions maybe drawn from the skill scores of monthly forecasts in various series. First, more skill was shown in forecasting Industrial Production and Demand in every time period than in the two series of the agricultural sector. Monthly outlooks in the two agricultural series had minus skill scores while the non-agricultural sector had skill scores of seven and eight for the entire period.

The other significant fact is the fine record for Industrial Production and Demand in 1946-50 when forecasters, to a degree, met the test of skill. The accuracy score for Industrial Production went down during the post-war readjustment, but the skill score improved over what it has been during the war years. Demand had an increase in skill score of 12 points while the level of accuracy stayed the same.

When forecasts of annual averages are considered, Demand was the only series which failed to show skill (skill score was −7). Prices Received by Farmers (skill score of 10) was lower than Farm Income (skill score of 17) or Industrial Production (skill score of 18).

The skill score for short-term monthly forecasts was five and for long-term, two. For forecasts of yearly averages, taking all series together, short forecasts had a skill of 17 while long-term forecasts showed no skill and had a score of zero. The agricultural area of Farm Income and Prices Received by Farmers both had high skill scores for short-term forecasts but did poorly on long-term.

The accuracy of forecasts made as an extension of a trend (which were used to determine skill) is useful in telling an additional fact. Trend scores used to determine skill averaged 68 and were over 60 in every series. Although this was only a sample of all possible changes, it is rather definite evidence that these series show persistent directional trends and are not random in nature.

Conclusions

It must be recognized that only a segment of the forecasting accomplished by the Federal government was examined in this study, although the areas examined were important ones. The level of accuracy revealed is encouraging in view of the difficulties of forecasting and the varied conditions encountered during the past 30 years. But it must be admitted that there are yet many weaknesses and imperfections in forecasting. The records of predictions of Prices Received by Farmers and of major economic changes are illustrative of this fact.

It should further be recognized that only accuracy and one measure of skill was considered in this research. There are many other problems which could bear investigation. More work needs to be done in evaluating accuracy. The use made of federal forecasts and their impact on the economy have not been adequately covered. Methods of forecasting need closer scrutiny with a view toward improving accuracy and adequacy of forecasting.

SOME EFFECTS OF INCOME TAX REGULATIONS ON FARMING EFFICIENCY*

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RISING tax rates, coupled with increasing farm incomes during the past decade, have made the income tax return an almost universal consideration on cornbelt farms. As a result, income tax regulations are exerting an increasingly important influence on farm decisions. The progressive income levy has been a powerful force in effecting major changes in the distribution of income. But it also has had important, though perhaps less striking, effects on the efficiency with which resources are used in the production process.

Analyses of income tax provisions thus far have been largely in terms of equity among taxpayers, revenue criteria, and administrative feasibility. Little attention apparently has been given their effects on resource efficiency. This paper attempts an analysis of the major points at which the income tax distorts the farm production process. The discussion centers around the relationship of income taxes to farming efficiency, because, while most of the problems involved are not unique to farm production, many of them appear to be aggravated by factors peculiar to farming. Only cursory attention is given in this paper to possible remedial measures.

Differences in Income Variability

Income is likely to be more variable in one type of farm production than in another. These differences, coupled with the progressive features of income tax levies, mean that over a period of years equal incomes are taxed unequally. While this tendency has obvious implications from the standpoint of equity in distributing the tax burden, it also has an important bearing on the resource efficiency aspects of tax measures.

In general, farming systems built around one or two enterprises (specialized farms) are likely to experience more variable incomes than are those that are diversified. Hence, potato, wheat, and turkey farmers are taxed more heavily than corn-hog farmers with equivalent mean incomes. Similarly, even more or less diversified farms will experience greater income variability where beef and lamb feeding is the major source of income than will farms organized around dairying. Heavier

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taxation on returns from certain resources would tend to shift these resources out of those uses involving "tax penalties." This withdrawal of resources would continue until a point was reached where marginal returns (after taxes) were as great in the uses with fluctuating income as in those where income was stable. However, in this new equilibrium position (as a result of the tax), fewer resources would be employed in types of farming with irregular incomes.

The magnitude of the differential in tax levies possible between variable and stable income patterns can be demonstrated with an exaggerated example. Under income tax rates prevailing for the year 1951, the two

TABLE 1. EXAMPLE COMPARING INCOME TAX LIABILITY ON A STABLE AND A FLUCTUATING INCOME PATTERN OVER A FOUR YEAR PERIOD, 1951 TAX RATES[a]

Year	Income Pattern A			Income Pattern B		
	Adjusted Gross Income	Exemptions and Non Business Deductions	Tax Liability	Adjusted Gross Income	Exemptions and Non Business Deductions	Tax Liability
1	0	$2400	0	$4000	$2800	$245
2	$8000	3200	$996	4000	2800	245
3	0	2400	0	4000	2800	245
4	$8000	3200	$996	4000	2800	245
Total Tax Over Four Year Period			$1992			$980
Average Tax per Year			$498			$245

[a] Assumes a married couple with a total of four exemptions filing jointly and claiming the standard non-business deductions.

different income flows illustrated by Income Pattern A and Income Pattern B in Table 1 would be taxed as indicated in columns 4 and 7 (assuming in each case a married couple with four exemptions filing jointly and claiming the standard non-business deductions) over a four year period.[1] It should be noted that the mean incomes in the two cases are equal. Yet the recipient of Income Pattern A would be taxed a total of $1,992 over the four year period or an average of $498 per year, while an individual receiving Income Pattern B would be taxed $980 for the same period or an average of $245 per year.[2]

Unlike several other of the distortions in resource use associated with income tax regulations, those arising out of the penalty placed by progression on irregular income could be dealt with fairly easily. The key to the

[1] Only the federal income tax has been considered in this and subsequent illustrations. In many states the state income tax further intensifies the disturbances created by the federal tax.

[2] The so-called "carry back and carry forward" provisions which apply in the special case of income flows involving a net operating loss modify but do not eliminate the differential taxation of the stable and irregular income patterns.

solution lies in the relationship of income variability to the length of the accounting period involved. As things stand now, the accounting period for income tax purposes is one year modified in some degrees by the "carry-back and carry-forward" provisions. In general, the shorter the time period being considered the more irregular will be the income pattern. If the accounting period were a single day, the income of many individuals would be highly variable. For example, the salesman who depends upon one or two sales a week for his income, the farmer on the cash basis, and even the grocer with a heavy week-end trade would be heavily penalized by progressive taxation. One means of minimizing the irregularity of income is to increase the length of the accounting period.

In the process of "evening out" income flows in this way, consideration must be given to the complications in administering the taxes that result. A period of perhaps four to six years would eliminate much of the irregularity in income but would still be feasible from the standpoint of simplicity of application. Taxpayers would proceed to pay taxes in much the same manner as at present, but at the end of the five year accounting period they would be given the privilege of recomputing their tax on the basis of their average income over the five year period. Any payment in excess of that which would have been paid on a stable income (plus perhaps a five per cent margin to reduce the number of refunds to be dealt with) would be refunded to the taxpayer.[3] Such a procedure actually has a precedent in the present withholding tax provisions where the tentative accounting period may be as short as a week or two with a final accounting on an annual basis. From the standpoint of administrative feasibility the plan has the merit of always involving a refund rather than an additional payment.[4]

Transferring Income Between Accounting Periods

The tendency for progression to impose a penalty upon irregularity of income gives rise to other important distortions, in addition to those discussed in the previous section. A large proportion of farm income tax returns are calculated on a cash basis. Therefore, January 1 becomes a highly important date in farm decision-making as farmers attempt to even out their income between years. As a point of departure for a discussion

[3] See Henry C. Simons, *Personal Income Taxation*, pp. 153-155. A similar proposal is advanced here. Simons, however, is concerned with the implications the progressive tax, coupled with irregularity, has for equity among taxpayers. The same measures would be appropriate for both insuring equity and lessening distortions in resource use.

[4] An income tax law containing these provisions still would involve some penalty to the taxpayer with the highly irregular income in terms of waiting for the refund. However, the "waiting" could be compensated for in the form of interest payments. The fact that taxpayers with irregular incomes would be waiting for refunds also imposes another practical limit on the length of the accounting period.

of the inefficiencies that can arise out of this equating process, let us examine more closely the "optimum" adjustment on the part of the taxpayer on the cash basis from the standpoint of minimizing taxes.

If he anticipated no change in income tax levies, he should attempt to equate this year's income with next year's anticipated income. If he had enjoyed an especially "good" year and looked forward to less favorable weather and cost-price relationships in the year ahead, he should attempt to postpone the realization of part of this year's income until next year. If the converse is true, he should endeavor to "even up" by realizing income this year instead of next. Only in the situation where the taxpayer anticipated approximately the same income in the year ahead would there be no incentive to alter either in one direction or the other the year in which income is realized. This shifting in the realization of income may be accomplished either by hastening or postponing sales or by altering the date on which inputs are purchased (or paid for).

One may digress at this point to observe that the process of "evening up" always involves an anticipated future income. The typical operator undoubtedly tends to be pessimistic about the magnitude of these uncertain future incomes. This means that the process probably is more often one of deferring realization of income (and payment of tax) than of hastening it. In addition, the fact that delaying payment also permits use of the money for a year undoubtedly is incentive to delay income realization, particularly on farms where the return to added capital is high. The uncertainty which attaches to future income tax levies is also a factor in the decision to shift income from one period to another. The optimistic individual who feels that easing the tax burden is imminent would react by postponing income realization, while the pessimistic taxpayer might attempt to realize as much income as possible before added levies are imposed.

How and under what circumstances can this shifting process give rise to inefficiencies? Regulating the sale of livestock is one of the most often used methods of making income transfers between time periods. The feeding period for hogs, fat cattle, and lambs can be either lengthened or shortened as the occasion demands. (Dairy and egg production do not lend themselves to this adjustment because the product is more in the nature of a "flow" and is perishable.) Delaying the sale of these products from one accounting period to another may involve adding units of product where marginal cost exceeds marginal revenue (the optimum level of output as indicated by the pricing system). The opposite adjustment (income is realized in the current year instead of next year) may mean selling before marginal cost equals marginal revenue. In the case of livestock, this "delayed" or "premature" sale may result also in marketing at a quality other than that justified by existing price relationships. Extending the length of the feeding period, for example, may involve putting a

higher degree of finish on low quality cattle than would otherwise be profitable, or if the adjustment resulted in a premature sale it might mean under-finishing cattle.

There are a number of other ways that the period in which income will be realized can be altered. Supplies can be purchased in advance of January 1 or the sale of grain can be delayed. In most situations it would appear that the resulting inefficiencies would be minor. In some instances, storage facilities would be maintained in excess of those necessary if this marketing (and purchasing) flexibility was not provided.

These adjustments that have been discussed are essentially of a short-run nature, but where attempts at "evening out" the income flow have resulted in a repeated postponement in the realization of income, the operator might well anticipate the necessity to push income ahead early in the year. When this situation develops, adjustments in the timing of production aimed at bringing livestock to optimum market weights (and/or finish) after the year's end can be undertaken in the initial phases of the production period. Here the result of the income tax might be to pull production away from the schedule best fitted to anticipated seasonal price variations and the organization of the farm resources. Once an operator has established a pattern of postponing the realization of as much income as possible until the succeeding year, he can avoid paying the penalty associated with progression only by continuing to postpone income or by experiencing a year in which a loss is incurred or income is very low. In some cases waiting for the year of depressed income might involve an extended period during which the timing of production is distorted.

It is recognized that these efforts to shift income between accounting periods arise out of the tendency of progression to tax the variable pattern more severely than the stable income flow. It is the type of flexibility provided by the cash basis for shifting income that causes the difficulty. If all farm operators were on the accrual basis these distortions would not arise, although some opportunity to transfer income from one year to another would still exist in the latitude provided in the evaluation of inventories. Making the accrual method mandatory would be one possibility for mitigating the effects of these income transfers. But if the penalty imposed by progression on the highly variable income were minimized, the motivation for shifting the realization of income would be largely removed. Hence, the proposal advanced to extend the final accounting period to perhaps five years with tentative yearly payments also would be appropriate for lessening the incentive to shift income realization between years.

Capital Gains Provisions

Under existing income tax regulations, income arising out of increases in the value of certain capital items is singled out for special treatment.

While the farm items which are to be so treated have been a source of confusion during the past decade, under recent clarification apparently all breeding stock, land, and buildings (held 12 months or longer) are subject to the capital gains provisions. Capital gains are treated differently from "regular income" in that they are (1) taxed at only 50 per cent of the regular rate and (2) recognized for tax purposes only when the capital assets are liquidated and the gains realized.[5]

This latter provision can tend to freeze patterns of resource use where the resources themselves and the situation surrounding their use have undergone change. The effect of these tendencies to freeze the organization of farm resources can best be explained through a series of examples.

Let us consider first a situation in which an individual purchased a farm to operate himself a decade before the sharp inflation in land values. Since the farm was purchased, the operator's position may have changed markedly in respect to available family labor and capital. His capacity to manage might also have increased. These changes would work together to produce a situation in which the productivity of added land likely

TABLE 2. EXAMPLE OF THE INCREASE IN INCOME TAX LIABILITY ARISING OUT OF THE SALE OF 160 ACRES OF LAND WITH FARM BUILDINGS PURCHASED IN 1941 AND SOLD IN 1951

Adjusted Gross Income from Farming Operations	$ 5,000
Tax Liability on Farm Income	428
Value of 160 Acres of Land and Farm Buildings in 1951[a]	51,600
Value of 160 Acres of Land and Farm Buildings in 1941	20,000
Increase in Value of Land and Farm Buildings[b]	31,600
Adjusted Gross Income with Sale of Land	20,800
Tax Liability Including Capital Gains from Sale of Land	4,482
Increase in Tax Accompanying Sale of Land	4,054

[a] Value of the dwelling excluded in both 1941 and 1951 valuation.

[b] Increase in land value from $125 per acre in 1941 to $322.50 per acre in 1951 is based on the rise in the index of the value of farm real estate in the West North Central Division from 65 in 1941 to 168 in 1951. Example assumes capital additions are just equal to depreciation during 10 year period.

would be very great. If the farm operator attempted to expand acrewise he would face a dilemma. He could increase the amount of land he farms by selling his present farm and reinvesting the proceeds in a larger unit, but if he chose this method he would pay a capital gains tax on the increase in value of his present unit. While only one-half of capital gains are treated as income for tax purposes, it must be paid at the progressive rate (along with income realized during the year from the operation of the

[5] It is not strictly accurate to state that capital gains are taxed at 50 per cent of the regular rate since it is in computing adjusted gross income that the concession is made. Therefore, due to the progressive features of present tax schedules, the tax on a capital gains may be considerably less than 50 per cent of the tax on the same amount of regular income.

farm and from other sources). In many cases this has the effect of imposing a heavy tax on the reorganization of resources even though the changes are in the interest of increased efficiency. Some idea of the magnitude of the tax involved with land purchased in 1941 and sold in 1951, for example, can be obtained from the illustration in Table 2.

The other alternative available to the farm operator wishing to expand his unit would be to purchase or rent land (or another farm) to combine with his present unit. The difficulty here is in finding land which is contiguous or otherwise well located in respect to the existing unit. Some farmers wanting to add to the size of their farm simply have not been successful. Instead, they either are continuing to farm a unit that is undersized in terms of their current resource position or they have purchased or rented added land not well located in respect to their present unit. In the former case, the inefficiency will take the form of underemployed resources or a low marginal value productivity of labor and capital resources; and in the latter case, it will involve moving feed and machinery from one unit to another, dislocations in the livestock program, and complications in coordinating the work on the two units.

While complicating the expansion of the farm acrewise is perhaps the most important effect of the "capital gains" provision on resource use, it is not the only one. We may cite the further example of the farmer who wishes to change from one type of livestock enterprise to another. The dairyman who is shifting to a beef breeding herd faces the necessity of paying a capital gains tax under existing regulations on the dairy animals he sells.[6] In this instance, the tax incurred (as in the case of land) depends not only upon the magnitude of the transaction involved but also upon the level of income attained during the year in which the transformation takes place.

Recent revisions in the capital gains provisions, which permit breeding stock to be treated as capital gains if held for 12 months or longer, open the door to further distortions in the livestock program. The fact that in-

[6] In the case of the operator on the cash basis 50 per cent of the sale value of the animals, plus any depreciation previously claimed, minus the purchase cost, is subject to income tax where the livestock was purchased and with home raised animals 50 per cent of the sale value is taxable. It should be noted that in this latter case the cost of producing the animals would have been deducted as an operating expense as they were produced. Where the accrual method is used, half of the sale value minus the inventory value is subject to tax, the full rate having been paid on accretion in value as it occurred. In the typical case on the accrual basis, there would be some tax involved in changing enterprises, particularly during periods of rising prices because of the latitude permitted farmers in evaluating inventories and the consequent tendency to keep inventory values below market values. The inconsistency in the treatment of capital gains between the two methods is obvious and raises the question as to whether the differential treatment can be allowed to stand without a universal shift to the cash basis on the part of those now using the accrual method.

come realized as capital gains is taxable only at the 50 per cent rate provides an incentive to realize income in this form. This may become important among livestock enterprises where it is feasible to increase the proportion of income realized as capital gains.

In the case of the hog enterprise, for example, changing from a system under which sows farrow two or more litters to where they farrow only one will increase the proportion of income from hogs realized as capital gains, since under the latter program approximately twice the number of sows in a hog enterprise of a given size will be marketed which meet the requirements for the 50 per cent rate. The magnitude of the tax savings that are possible from making this change depends upon the size of the operation and the level of taxable income attained. On a farm where 60 litters are farrowed yearly and a taxable income of $6,000 or over is realized, tax savings would be $250 to $300. In some cases tax concessions of this magnitude could well be the decisive factor influencing the choice of the one litter program.

In the case of dairying, heifers of mediocre breeding and quality that ordinarily would be vealed can be held long enough to produce a calf and treated as capital assets. In circumstances where the beef raiser normally fed out the calves he produced, there would be an incentive to market heifers as "breeding" stock instead of as beef animals. The latitude that will be permitted the beef producer in this respect is not clearly defined. If he is permitted to claim capital gains without having the heifers produce a calf, one would certainly expect the beef feeding program to be adjusted to take advantage of the capital gains treatment. Even if a strict interpretation is given the provisions and only heifers that have borne a calf are allowed to qualify, there still would be a tendency toward more rigorous culling with more heifers saved and more cows marketed each year.[7]

While no quantitative estimates are available concerning the role the capital gain provisions play in distorting patterns of resource use, observation would suggest that it is an important one, particularly at the present, as a result of the persistent rise in land and livestock values. Several possibilities exist for minimizing the inflexibilities and other distortions arising out of capital gains. The taxpayer himself can mitigate the effect

[7] It should be emphasized that the interpretation which will be given the new capital gains provisions by the administrative agencies and courts are not yet clear. Apparently, it is the opinion of some administrative officials that sows must produce two litters and heifers more than one offspring. If this is the ultimate interpretation given the capital gains provisions, it will mean that the distortion in hog production would run in the other direction, i.e., one-litter producers would tend to shift toward a system where two or more litters were farrowed per sow. However, requiring two offsprings from beef and dairy heifers would greatly reduce the incentive to qualify more of these animals for capital gains treatment.

of the "tax" on making the transfer from one type of livestock enterprise to another by selling a part of the herd each year over a period of years. While this procedure would tend to lessen the impact of progression, it would involve a transition period of several years during which either the size of business would be restricted or two or more small scale enterprises would be maintained in the place of a single large one.

Compulsory reporting on the accrual basis would eliminate much of the tax on changing from one livestock enterprise to another. While it would have the net effect of increasing taxes over a period of years, since any appreciation in value would be taxed as regular income, the tendency for the tax to accrue and be payable at the progressive rate at the time of liquidation of the enterprise would be largely eliminated. This tendency still would persist in some degree because of the latitude that is permitted in the evaluation of inventories and the resulting inclination of farmers to keep inventories at a level below their market value. Similarly, the change to the accrual basis would greatly lessen the opportunity to realize income as capital gains, and therefore would tend to minimize the distortions arising out of this feature of the tax. (This assumes that the present provisions for treating the inventorying and sale of home raised livestock under the accrual method will be strictly interpreted.) The incentive to realize income as capital gains could be eliminated completely only by dispensing with the tax concession granted capital gains.

Altering tax regulations to permit re-investment of capital in other forms without subjecting the gains to tax would appear to be a particularly effective procedure for mitigating the inflexibilities arising out of the capital gains tax on land and livestock. The farm operator who wishes to purchase a larger farm could be exempt from a capital gains tax on the capital freed from selling his present unit, providing it was re-invested within a specified period of time. Similarly, in the case of the dairyman changing to beef production, that portion of capital freed from dairying which was re-invested in a beef herd would not be taxed.

There is a precedent for this type of regulation in the recent revisions that permit a home owner to sell one dwelling and buy another within a certain time without incurring tax liability on any capital gains realized and re-invested. There would be difficulties here in defining the degree of latitude to be permitted in re-investing in other forms of capital. If too much freedom is permitted the door is opened to using the provisions to evade tax liability. On the other hand, if the limits are defined too narrowly the ameliorative effects of the special measures would be limited.

Increases in Leisure

Viewed in a broad sense, leisure is income in kind that is not, and probably can not be, taxed. This has made the "incentive problem" one of the

most widely discussed aspects of the income tax. The inability to tax leisure has particular significance in the farm sector of the economy because of the wide range of opportunity the farmer has to choose between differing combinations of leisure and activity directed toward producing money income. Freedom to make this choice is greatly restricted in most other occupations. The length of the work week for most wage earners is fairly well fixed by tradition and union regulations. Similarly, the number of working hours of the salaried worker is largely out of his hands. Even the professional man frequently finds his freedom to choose between leisure and added income restricted by pressure from his clients.

Given freedom of choice, the manner in which an individual will allocate his time-energy between leisure and work will depend upon (1) the nature of the leisure-income transformation function (the amounts of leisure that will have to be sacrificed in order to realize added increments of income) and (2) the marginal rate of substitution of leisure for income, or the things that money income will buy, as "consumption" items.

The manner in which these relationships apply to the allocation of time-energy between leisure and productive activity is illustrated in Fig. 1. Here curve A B_1 represents a leisure-income opportunity curve, leisure being represented on the Y and income on the X axis, setting forth the possible combinations of leisure and income that an individual could realize in the absence of the income tax given his skill and stock of cooperating resources. Allocating all his time-energy to leisure activities would result in O Y_3 units of leisure, or devoting all of it to money making activities would result in O X_4 units of income. He can also allocate his time-energy between leisure and productive activities so as to realize any combination of leisure and income indicated by curve A B_1. The first units of leisure that are taken result in small decreases in income, but as further units of leisure are realized the resulting decrements in income grow larger (leisure substitutes for income at an increasing rate). The reverse also is true, i.e. added increments of income are obtained at the expense of giving up increasingly greater amounts of leisure. This necessity to sacrifice leisure to obtain added increments of income reflects the tendency for labor-management to substitute at a decreasing rate for other inputs in the farm production process.

The imposition of an income levy will result in a change in the opportunity curve in the direction represented by the shift of curve A B_1 to A B_2 in Fig. 1. The opportunity for leisure is, of course, unaltered by the tax. But the opportunity for income after taxes (if all time-energy is devoted to money making activities) has decreased from O X_4 to O X_2. The amount of leisure that must be sacrificed to obtain a given increment of tax free income also is unaltered by the tax up to the level of income where the tax becomes effective, but beyond that an increased quantity

of leisure must be given up to obtain a given increment of income.

Before predicting the final effect of the tax in altering the combination of leisure and productive activity, knowledge of the manner in which income (the items that can be purchased with income) and leisure substitute as consumption items is essential. Indifference curve C_1 D_1 indicates combinations of leisure and income that will result in equal satisfaction. This is one of a "family" of indifference curves making up the leisure-income indifference surface. The point of tangency of opportunity curve AB_1 with the highest possible indifference curve, in this case C_1 D_1 in Fig. 1, indicates the maximum satisfaction attainable with the opportunity curve and the indifference surface postulated. At this point the rate of substitution of leisure for income as a consumption item is equal to the rate of substitution of leisure for income in the production relationship. Hence, in the absence of the income tax, the individual will allocate his time-energy so that he will have O Y_1 units of leisure and O X_3 units of income.

The advent of the tax will result in the opportunity curve being tangent to a lower indifference curve C_2 D_2 except in the special cases where (1) the rate of substitution of leisure for income approaches infinity and (2) the level of income earned prior to the tax was insufficient to make the progressive levy effective. The degree and the direction in which leisure will be shifted depends upon (1) the shape of the indifference curve (the rate of substitution of leisure for income) and (2) the change, if any, in the shape of the indifference surface as the shift is made to the lower indifference curve.

Let us examine first the case in which no change in the rate of substitution between leisure and income is involved in the shift to the lower indifference curve. Here the amount of time-energy devoted to leisure would be increased. This would always be the case (assuming no change in the shape of the indifference curve) except (1) where the individual involved was completely indifferent to leisure (the rate of substitution of income for leisure was infinite) or (2) where the individual's income did not reach a level sufficiently high to be taxed (either because of the nature of the leisure-income opportunity curve or because of the high value placed on leisure relative to income by the individual). Both of these exceptions are obviously special cases. The more general case (assuming no difference in the two relevant indifference curves) would be an increase in the amount of leisure (O Y_1 < O Y_2 in Fig. 1).

Where the rate of substitution of leisure for income (the indifference surface) is altered with the imposition of an income tax (the shape of the indifference surface is different for lower indifference curves) the change in the amount of time-energy devoted to leisure can be in either direction and of varying magnitudes. In some instances the change might be such

as to decrease the amount of leisure. This would result where the rate of substitution of leisure for income was greatly decreased in the change to the lower indifference curve (a situation in which the pressure for income was great). But with individuals more comfortably situated with respect to income, the rate of substitution of leisure for income may not be less (and could be greater) on the lower indifference curve. Here the tax would lead to more leisure. While this is a matter which could be settled only by empirical investigation, we would expect this to be the general case.

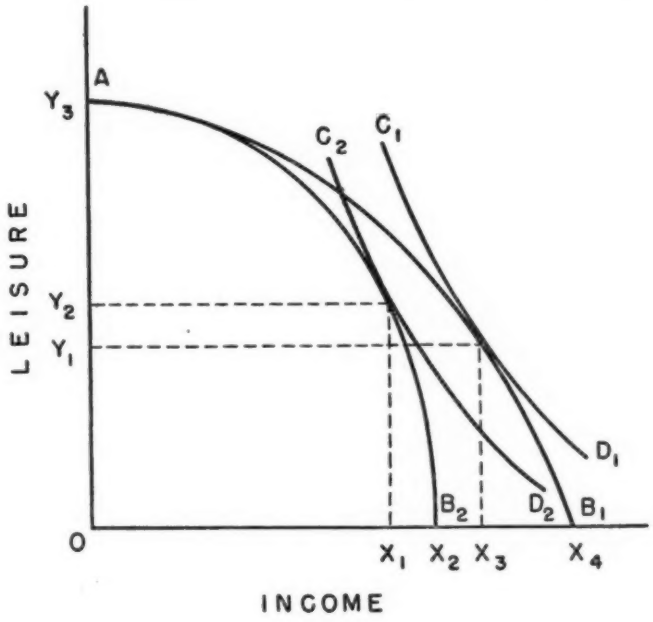

FIGURE 1

In actual farm situations, the emphasis on leisure (arising out of the tax) would be reflected particularly in those types of activity requiring a large expenditure of the operator's time and energy per unit of income produced. In many instances it would take the form of the farm operator shrinking from certain tasks which he regards as disagreeable or from jobs which are on the margin as far as profitability is concerned.

For instance, he will be less inclined to spend time at night tending to the hog enterprise during the farrowing season or he will be more reluctant to engage in the tedious task of picking up corn that has been left in the field as a result of unfavorable harvesting conditions. There will also be a tendency for the farm operator to substitute an increasing amount of hired labor and labor-saving equipment for his own labor. The income tax

has a tendency to reduce the operator's costs of these inputs relative to the cost (in terms of the leisure sacrificed) of the operator doing it himself. While the farm operator is apt to look upon the process as one of the "government paying part of the cost" of the hired man or the labor saving gadget, its net effect is one of substituting leisure for money income.

It would seem that these are almost inevitable consequences of the income tax. Certainly no one would seriously suggest that the way out of the dilemma is to levy a tax on leisure (as would appear to be logical solution in the case of certain other types of income in kind). It can be demonstrated that as the tax rate increases (as the slope of the leisure-money income opportunity curve is increased through taxation), there will be a tendency *(ceteris paribus)* for greater amounts of leisure to be substituted for money income. This emphasizes the conflict that exists between increasing revenue and maximizing efficiency in an income tax program.

Income in Kind

Possibilities for distortions in the use of resources arise also out of the manner in which income tax legislation defines income. At present no attempt is made to include income in kind in arriving at an income base. As with leisure, this omission is of greater importance on farms than in most other sectors of the economy because of the wide range of opportunities that the farmer has for producing income in kind.

An individual who is self-sufficient (produces all of the items entering into his pattern of consumption) escapes taxation completely under existing legislation regardless of the magnitude of the "real income" he is able to earn in this way. In the case of many items that enter into consumption such as automobiles, refrigerators and television sets, the advantages of specialization are so great that no one undertakes to produce them primarily for his own use. But in the case of some farm products that may be used for direct consumption, the income tax advantage may be sufficient to outweigh the disadvantages of small-scale production. For example, in corn belt agriculture the farm operator frequently faces the decision of whether to produce dairy products for the household or to purchase them and to use the resources thus freed to expand other enterprises producing for the market. Similar decisions arise in respect to truck corps, poultry products, meat, and fuel.

The situation found on commercial farms where opportunities exist for allocating resources between production for the market and direct household use can also be illustrated in Fig. 1, since the relationships are similar to those in the leisure-income analysis. Hence, curve A B_1 can also serve to represent an opportunity curve setting forth the combinations of products for direct household consumption and money income possible with a given stock of resources. Let indifference curve C_1 D_1 represent the

rates at which household products substitute for money income (or goods and services that can be purchased with money income) in the consumption function. Then the point of tangency between AB_1 and C_1 D_1 (the highest indifference curve tangent to AB_1) indicates the combinations of production for the household and for money income (OY_1 units of production for the household and OY_3 units for money income) forthcoming before the advent of the income tax. Again the tax alters the slope of the opportunity curve as represented by the shift from AB_1 to AB_2 in Fig. 1.

The possibilities for household production would remain unchanged if all resources were to be used for this purpose, but OX_2 instead of OX_4, units of money income (after taxes) will result where all resources are allocated to that end. The opportunity curve will remain unchanged to the level of money income at which the income tax becomes effective but beyond that its slope will increase. The rate of substitution of money income for household products increases and hence greater quantities of household products must be sacrificed to obtain a given increment in money income, after taxes, than was true prior to the tax. As a result of the tax, the new opportunity curve will be tangent to a lower indifference curve C_2 D_2 and, assuming no change in the slope of the indifference curve, output of products for household use will increase from OY_1 to OY_2. The amount of money income realized (after taxes) will decrease from OX_3 to OX_1.

The importance of income tax concessions in perpetuating small scale enterprises producing primarily for direct household consumption is problematical. Certainly the emphasis by some cornbelt farmers on household production is a holdover from the past when distance was a barrier in supplying perishable commodities through the market. The fact that the farms on which income tax rates are high (due to a higher level of income) tend to be the same ones on which the opportunity cost of labor and management for use in household production is great, no doubt helps to minimize distortions created by the differential taxation. However, the writer has observed that in discussing the economy of household enterprises with students, the income tax question invariably arises. This suggests that farmers do give it consideration in their planning.

The most obvious remedy for any tendency for income tax levies to push farm production in the direction of products for home use is to tax income-in-kind at the same rate as money income. As a result of such revision, the entire opportunity curve would shift toward the origin as represented by the change from A_1 B_1 to A_2 B_2 in Fig. 2. The opportunity curve would be tangent to a lower indifference curve (C_2 D_2) because of the tax but no shift toward household products would result.

$$\left[\frac{OY_1}{OX_1} = \frac{OY_2}{OX_2}\right] \text{ in Fig. 2.}$$

It would appear that many of the difficulties discussed could be dealt with through changes in income tax regulations, without undue complications. In this connection, the mischief caused by the cash basis of accounting, and by the rigid adherence to an accounting period of only a year's duration are particularly striking since both these sources of difficulty

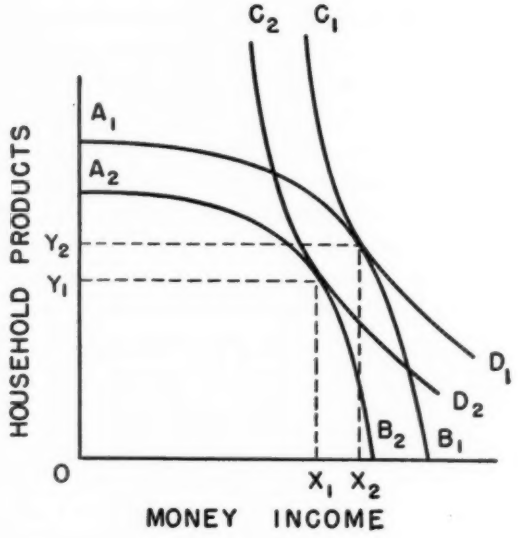

FIGURE 2

could be minimized fairly easily. Unfortunately, the difficulty arising from the failure to tax leisure, which might well prove to be the biggest problem, particularly if income tax rates are pushed still higher, appears to be an inevitable consequence of the income tax.

Finally we have concerned ourselves exclusively with the efficiency aspects of the income tax. There are other criteria that cannot be ignored in evaluating a tax program such as equity among tax payers, revenue characteristics, and administrative feasibility. These have been purposefully left aside in our analysis in an attempt to limit its scope to manageable proportions. One further fact that should not be ignored is that the ends sought in a taxing program are sometimes in conflict. Therefore the final provisions must be in the nature of a compromise, which means that efficiency in some instances must be sacrificed to other ends.

COMPARATIVE PRODUCTIVITY OF SHARE- AND CASH-RENT SYSTEMS OF TENURE

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IN RECENT writing about methods of renting farm land, comparisons are made between schemes of rental agreements.[1] This paper compares the economics of two classes of rent systems, share and cash. Each system is considered as a typical absolute, stripped of modifications common in practice. Consideration of the systems in this way makes possible a comparison of share- and cash-renting in essence.

By *share-rent* is meant an arrangement for turning over a stated proportion of the product to the landlord as rent, the landlord making no other contribution than land. By *cash-rent* is meant an arrangement in which the tenant pays a flat sum for the right to operate the farm.

Results of the comparison show that in its entirety a share-rent agricultural economy can not be more productive than a system based on cash-rent, but it can be considerably less productive. In this paper *product* and *productivity* refer to the physical quantity of output of the agricultural system as a whole.

Johnson restates the long-held theory that share-renting should result in less intensive farming.[2] He concludes that the short-term crop-share lease may be a useful device for obliging share-tenants to use land more efficiently (intensively) than they do on a long-term crop-share lease. He also concludes that a hypothesis of equal total rents under share and cash systems implies exploitation of share-tenants, if the share system yields less total income than the cash system.[3] It will be shown that the condition favorable to share-tenancy itself is the same condition which should make it easy for landlords to impose short-term leases. This condition is that labor is cheap in comparison to land. Conversely, the very condition

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[1] D. Gale Johnson, "Resource Allocation Under Share Contracts," *Journal of Political Economy*, April, 1950. See also Rainer Schickele, "Effects of Tenure Systems on Agricultural Efficiency," *This Journal*, February, 1941, and Earl O. Heady, "Economics of Farm Leasing Systems," *This Journal*, August, 1947.

[2] Johnson, *op. cit.*, pp. 116-118.

[3] Johnson, *op. cit.*, p. 120-122.

which renders share-tenancy "inefficient," namely, high labor-productivity, is the condition which will interfere with forcing tenants to accept short-term leases. It will also be shown that share-tenant incomes less than cash-tenant incomes do not necessarily imply exploitation by landlords.

Schickele[4] and Heady[5] discuss the comparative intensities of working land under different kinds of rent-agreements. Schickele's comparison is, again, unfavorable to share-rent. He proposes variations in leases to effect a recapture of economic rent for the landlord. Thus the operator should find it to his advantage to employ inputs to the point of equality of marginal costs and marginal revenue. As Johnson showed, this latter condition is typical of the cash renter.[6] Heady analyzes devices for improving leasing arrangements, the perfection of the lease agreement being concomitant with optimum productivity, considering the short and the long run.

The ratio of the product of a share-rent system to the product of a cash-rent system depends upon the character of the production function of a farm and upon the labor-income indifference function of the farm operator. In this paper a function giving this ratio will be determined, upon the basis of assumptions given in the next section. The ratio will be shown to be less than one for all practically significant values of constants in the assumed production and indifference functions.

Assumptions

(1) The production function of a farm, with the product per season measured in dollars (gross income) is:

$$P = x^a y^b.$$

In this formula P is the value of product; x is the per season inputs by the tenant, reduced, for simplicity, to labor-units, and y is the acres of land in the farm.[7] The two exponents, a and b, are the elasticities of total product with respect to the factors and are parameters of the economic system.[8]

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[4] Schickele, *op. cit.*, pp. 192-196.

[5] Heady, *op. cit.*, p. 659.

[6] Johnson, *op. cit.*, pp. 118-120.

[7] The fact that there are only two classes of inputs, the operator's labor and land, does not invalidate the conclusions. For the present, the tenant's inputs can be thought of as present labor plus past labor at interest. Or, the view can be taken that his inputs consist of labor and capital, the expenses of capital being met by off-farm work. In the latter case his inputs amount to present labor, in the former, to past labor at interest plus present labor. Results of the analysis are not essentially altered if the production function is taken to include one or more variables representing capital inputs by the tenant. In this case, we get into a production function containing three or more variables. The algebra is simplified by taking product of the farm to be a function of two factors.

[8] For an early use of this function see Knut Wicksell, *Lectures in Political Economy,*

(2) Returns to scale are constant; $a + b = 1$.[9]

(3) There is a labor market in which the prospective and actual tenants can be employed. Workers have an indifference surface which expresses combinations of work and income at various levels of total utility from income and leisure both taken together.[10] The condition of the labor market is defined by the highest indifference curve on which the worker can place himself *as a farm operator.* The indifference curve attainable as an industrial worker, for example, could be expected to be different in shape but in total satisfaction would be neither better nor worse. It will be shown that the system of tenure has an impact on the point at which the relevant indifference curve is reached. It is assumed that the curve itself is the same in function regardless of the system of tenure; the farmer is motivated altogether by considerations of income for work, and not by attitudes toward risk or subjective elements implied by differences in tenure systems. To the extent that share tenancy is less risky for the farmer (the rent-liability depends on the gross income) this latter assumption is open to question. This latter risk-mitigating effect of share tenancy may be offset by the fact that at the margin the share tenant risks his inputs not only for his own income but for the landlord's income as well.

The relevant indifference curve is given by:

$$Y = K + rx^a,$$

I, pp. 110-130. The use of this form of production function in the present case can be questioned on at least two counts:

(1) Investigations by Heady ("Production Functions from a Random Sample of Farms," *This Journal,* November, 1946, pp. 989-1004), Tintner and Brownlee ("Production Functions Derived from Farm Account Records," *This Journal,* August, 1944, pp. 566-571) and the author's thesis ("Problems and Results in the Use of Farm Account Records to Derive Cobb-Douglas Value-Productivity Functions," unpublished Ph.D. thesis, Michigan State College, 1952, pp. 43-51) show that

$$P = Cx^a y^b$$

will give a better fit by multiple regression to farm account and farm record data than will

$$P = x^a y^b.$$

These investigations show, however, the value of C to be greater than one. If a constant term C, greater than one, is carried through the following analysis it turns out that the effect is to reduce the comparative productivity of the share system.

(2) This form of production function gives constant elasticity of product with respect to individual factors. It is possible that marginal returns to a factor should at first increase, and then decrease. The production function is used in this paper to indicate product and marginal product within the range of practical economic decisions. For these purposes it should give reasonably good statements. Furthermore, should the elasticities of product with respect to the factors be individually altered as less than practical amounts of the factors are employed, this still would not affect the marginal decisions of farmers. The decisions with respect to the use of factors are made within the range of economically practical operations.

[9] Knut Wicksell, *ibid.*

[10] See K. E. Boulding, *Economic Analysis,* pp. 742-744.

where Y is the income of the tenant per season; x is the units of labor of the tenant, and K, r, and g are parameters given by the condition of the labor market and the relative utilities of income and leisure. In order for the indifference curve to move upward and to the right at an increasing rate, g is greater than one.

(4) The total area of farm land is A acres. The farm land is uniform in its inherent productivity and nearness to market. Except for awkwardness we could speak of "$100-value-units" of land, and it would not be necessary to assume uniform productivity and position.

(5) The demand for the product of agriculture is infinitely elastic. The general import of the conclusions does not rest upon this assumption; the algebra is shortened. In the case of a limited farm area selling a surplus above local consumption on a large national or world market, the assumption is defensible as it is.

(6) The landlords maximize rent by charging in a manner to get the highest total return, without forming a combination. Any landlord charging less or more than the equilibrium rent would have many or no prospective tenants. In the paragraphs which follow we shall prove the ratio of the productivity of the share- to the cash-rent system. After this, an arithmetic example will be given, with assumed values of the economic parameters given above.

Proving the Case

The Product of A Share System. We can first determine the inputs of the tenant in the operation of a farm. There are two equations:

$$Y = K + rx^g, \quad \text{and}$$

$$P = x^a y^b.$$

As the tenant will get a specified proportion of the total product, the tenant's income can also be given by

$$Y = sx^a y^b,$$

where s is the share to the tenant and is to be determined (Figure 1). Thus the tenant's equilibrium income is given by both sides of the equation:

$$(1) \qquad sx^a y^b = K + rx^g.$$

Not only does the equation hold, but the curves given by the left- and right-hand sides are tangent. The condition of tangency states that the tenant, by operating the farm, is able to reach the indifference curve relevant to him, but cannot reach a higher one at this equilibrium. The number of acres in the farm and the share terms are adequate but no more than adequate to hold him.

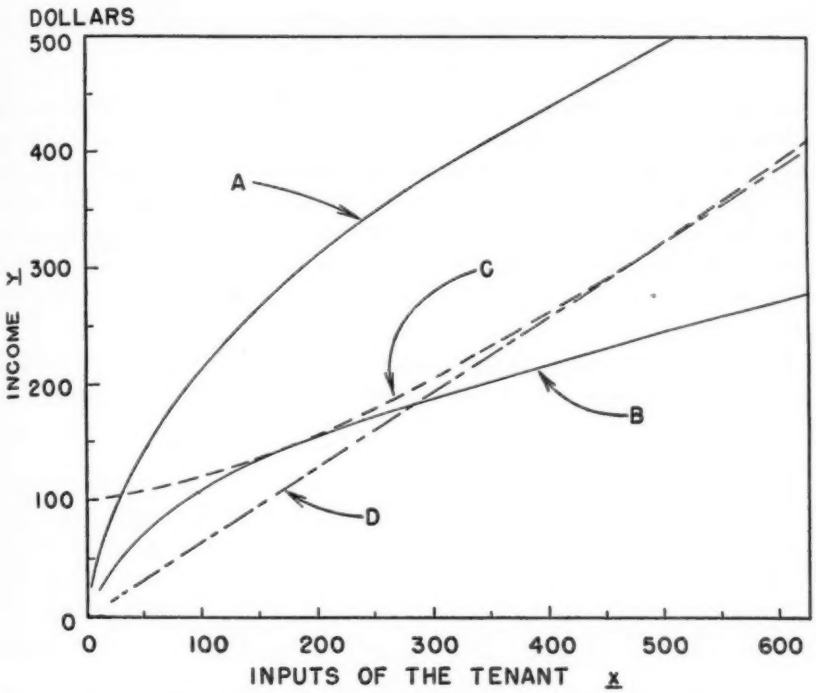

FIG. 1. A Hypothetical Agricultural System: Solution of the System when Based on Share-Rent, and Equilibrium per Season and per Labor-Unit Income of the Tenant when Based on Cash-Rent.

Legend: A. Product of the optimum share-rent farm.
Share to tenant $= \frac{1}{2}$
$z = 488.6$ acres
$Y = x^{\frac{1}{2}}\ (488.6)^{\frac{1}{2}}$
B. Income to share tenant.
$Y = \frac{1}{2}x^{\frac{1}{2}}\ (488.6)^{\frac{1}{2}}$
C. Operator's indifference curve.
Income $= 100 + 0.02x^{1.8}$
D. Cash-rent system.
Line of labor inputs times equilibrium income of tenant per input-unit.
"Wage" rate of tenant $= \dfrac{\Delta Y}{\Delta x} = W$
Total area of farm land: 100,000 acres.

The condition of equality given by (1) and a condition of equal slopes of the two expressions for the tenant's income will result in tangency of the two curves. Thus, in addition to (1), above:

$$\frac{\partial(K + rx^{g} - sx^{a}y^{b})}{\partial(x)} = 0. \tag{2}$$

Solving (1) and (2) for x:

$$x = \left[\frac{aK}{r(g-a)}\right]^{1/g}. \tag{3}$$

Thus x, the inputs of the tenant, is given in terms of parameters of the economic system. It may be noted that it makes no difference to the tenant what are the share terms or what are the number of acres in the farm, provided they are consistent. His income must respond to his work in such a way that he reaches the indifference curve which applies to the market for labor at the time. This condition is fulfilled by the parameters of labor's indifference curve and the elasticity of the income of the farm with respect to the tenant's labor.

The number of acres which a landlord will make available to a tenant in order to hold him can be determined from (1). It is y, in acres:

$$y = \left[\frac{K + rx^g}{sx^a}\right]^{1/b}. \tag{4}$$

As could be anticipated, the size of the farm needed to hold the tenant is an inverse function of the share of the product which goes to the tenant, s. Otherwise the size of the farm is given in terms of the tenant's inputs, x, (already defined in constant terms) and parameters of the system. It is necessary to find the share terms in order to establish the size of farm which will prevail.

The landlords individually will be able to require share terms which give them the largest total rents. These terms can be found in the following way: Express the total rent of any landlord in terms of constants, except for s, and maximize with respect to s. Let

$$y = \left[\frac{K + rx^g}{sx^a}\right]^{1/b} = \left[\frac{q}{s}\right]^{1/b}$$

$$\text{and } x = \left[\frac{aK}{r(g-a)}\right]^{1/g} = m.$$

In this case total rent can be stated as the number of farms times the rent per farm, for any tract of land A_i, held by any one of N landlords. The rent per farm is, of course, the product of the farm less the income of the tenant. Thus the total rent of A_i acres is

$$TR_i = A_i \frac{s^{1/b}}{q}\left[m^a(q/s) - sm^a(q/s)\right]. \tag{5}$$

The rent for A_i acres is given by constants except for the share terms. The maximum rent will be reached when the rate of change of total rent with respect to s is zero. Taking the first derivative of (5) with respect to s and setting to zero, the share to the tenant is[11]

[11] See Knut Wicksell, *op. cit.*, pp. 115-117.

$$s = 1 - b = a. \tag{6}$$

This is the share of the income of the farm which must go to the tenant in order to maximize rent to the landlords. Since this share maximizes rent for any landlord, it is the share by which the maximum rent is taken by all landlords.

The size of farm under the system is now determined from (6) and (4). It is y, in acres:

$$y = \left[\frac{K + rm^a}{am^a}\right]^{1/b}. \tag{7}$$

With all of the unknowns in the system now determined, it is possible to state the total product and the total rent. The total product of the share system is

$$TP_s = (A/y)x^a y^b.$$

Substituting the values of x and y from (3) and (7) and simplifying,

$$TP_s = A\left[\frac{gK}{(1-b)(g-a)}\right]^{1-(1/b)}\left[\frac{aK}{r(g-a)}\right]^{a/gb}. \tag{8}$$

To solve for the total rent we have the not surprising condition that the part of the income not going to the tenants goes to the landlords. Total rent follows from total product in

$$TR_s = (1 - s)TP_s. \tag{9}$$

With the aid of (6) this turns out to be bTP_s, the elasticity of product with respect to land times the total product. The solution of a hypothetical system with assumed constants, a, g, K, *etc.*, is shown in Figure 1.

Total Product and Total Rent of a Cash-rent System. Before giving the arithmetic results of an illustrative share system, we shall solve for the mathematical values of total product and total rent when the farms are rented for cash. The parameters of the economic system will be the same as they were for the share system.

If a farm is operated by an owner, by hired help, or by a cash tenant, the income can be divided into two parts; namely, that accruing from the land, and the income accruing from inputs other than land. In this analysis we have taken all inputs other than land to be expressible as past or present labor. In the case of the cash tenant, if his past labor (capital) and his present labor make up his costs of operating the farm other than rent, then he, in competition with other prospective tenants, will need to turn over all of the surplus above these costs to the landlord in order to hold the farm. Not only must all of the surplus go to the landlord, but the tenant must employ factors in such quantities and proportions that the surplus (rent) is maximized on a per acre basis.

The cases of the owner-operator, the owner who hires his farm operated, and the cash tenant are theoretically comparable in the question of rent. The owner-operator will value the farm (pay for it) at a price which capitalizes the returns above the cost of operation, as will the owner who hires the farm operated. The cash tenant, in order to hold the farm, must pay a rent which represents the maximum return per acre above all operating costs, including his own labor. The cash-rent system which we are comparing to a share-rent system is thus analogous except for identity of owner, entrepreneur, and laborer, to operator-ownership or cash-hiring.

The size of the farm and the inputs by the tenant are determined by maximizing rent per acre with respect to acres per farm and with respect to tenant inputs per farm. The inputs of the tenant can be found by solving for x when

$$\frac{\partial(x^a y^{b-1} - Ky^{-1} - rx^g y^{-1})}{\partial y} = 0 \tag{10}$$

and

$$\frac{\partial(x^a y^{b-1} - Ky^{-1} - rx^g y^{-1})}{\partial x} = 0. \tag{11}$$

These equations mean that the land is rented in farms of a size consistent with the maximum rent per acre and that the tenant employs his inputs to the point where he can pay the full rent consistent with his relevant indifference curve.

From (10) and (11)

$$x = \left[\frac{K}{r(g-1)}\right]^{1/g}. \tag{12}$$

It will be noted that the above is also the value of x at the point of tangency of a line through the origin to the indifference curve in Figure 1. It is evident from Figure 1 that the point given by this tangency gives the value of x at which the farm operator receives the lowest rate of pay per hour or per day consistent with his indifference curve. Thus under the cash system the tenant in this case (1) receives all of the income of the farm at the margin, and, in order successfully to bid for the farm (2) he takes the lowest *rate* of pay per unit of labor that he can accept.[12] This is shown in Figure 2.

The size of farm to hold the tenant and at the same time maximize rent can be determined as follows: Let C be the cash rent per acre. Then the income of the farm going to the tenant can be designated by

[12] For an analysis of rent assuming a flat wage rate but not an indifference curve for labor see Knut Wicksell, *op. cit.*, pp. 127-130.

$$Y = x^a y^b - Cy.$$

The total equilibrium income to all cash tenants on a tract of land A_i is

$$\Sigma Y = A_i x^a y^{b-1} - A_i C = A_i y^{-1}(K + rx^g) \tag{13}$$

and

$$C = x^a y^{b-1} - Ky^{-1} - rx^g y^{-1}.$$

With respect to y, the acres per farm, for any fixed value of x, the cash rent per acre, C, will be at a maximum where

$$\frac{\partial C}{\partial y} = 0.$$

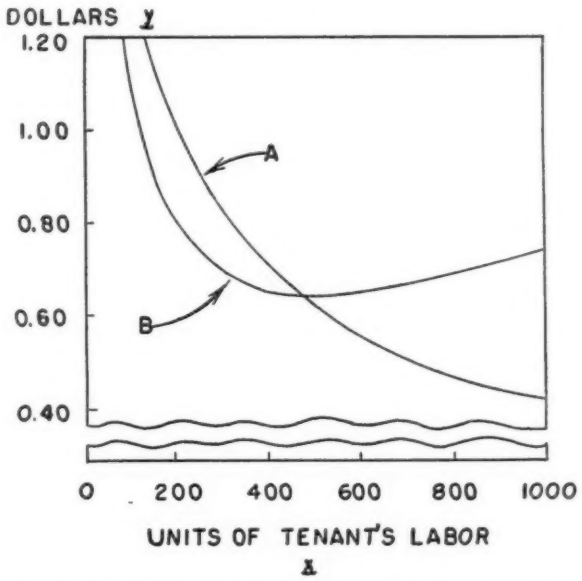

FIG. 2. Equilibrium of The Tenant's Income per Unit of Labor And The Value of The Marginal Product with Respect to The Tenant's Labor in An Illustrative Cash-Rent Agricultural System.

Legend: A. Value of Marginal Product with Respect to Tenant's Labor.

$$\frac{\delta x^a y^b}{\delta x}$$

B. Indifference Income of Tenant per Unit of Labor.

$$\frac{K + rx^g}{x}$$

Explanation: $y = 775.6$ = equilibrium acres of land in farm.
$K + rx^g = 100 + (1/50)x^{3/2}$ = labor-income indifference curve of the tenant as a farm operator.
$x^a y^b = x^{1/2} y^{1/2}$ = production function of the farm.

Setting the partial derivative to zero:

$$(14) \qquad y = \left[\frac{K + rx^g}{x^a(1-b)}\right]^{1/b}.$$

As the value of x has already been given as a compound constant it is evident that y can be stated in terms of constants.

The total product of the cash system is given by

$$(15) \qquad TP_c = A\left[\frac{K}{r(g-1)}\right]^{a/gb}\left[\frac{gK}{(1-b)(g-1)}\right]^{1-1/b}.$$

As in the share system total rent turns out to be total product times the elasticity of product with respect to land, thus[13]

$$(16) \qquad TR_c = bTP_c.$$

Ratios of Total Product, Total Rent, and Total Tenant's Income, of a Share- to a Cash-rent System of Farming. Having expressions for total product of the share system and of the cash system, given identical relevant parameters of the economic system as a whole in each case, it is possible to establish a ratio of productivity. Writing the two total products as a ratio in parameters and simplifying,

$$(17) \qquad Ratio,\ (TP_s/TP_c) = \left[\frac{g-a}{g-1}\right]^{a(g-1)/g(1-a)} a^{a/g(1-a)}.$$

It has been shown that total rent in both cases resolves into the elasticity of product with respect to land times the total product. Thus both total products are multiplied by the same value (b) in order to get total rent. Therefore the ratio of total rent is equal to the ratio of total product. It follows that the ratio of total income to the tenants must also be equal to (17).

The above ratio may or may not be interesting depending upon how it behaves for plausible values of a and g. For example, if it turns out to be one or very nearly one for all values of a and g which can be economically relevant, then the total products of the two systems will theoretically be equal or nearly so. We shall now consider values of a and g and plot the function (Figure 3).

The elasticity of product of a farm with respect to the operator's inputs in the case of constant returns to scale must be between zero and one. Thus a can take on values only in that range. The other term in the ratio, g, is the exponent of the inputs (x) of the worker in labor's relevant indifferent curve, $Y = K + rx^g$. In order that the indifference curve will move upward at an increasing rate this exponent must be

[13] Knut Wicksell, *op. cit.*, pp. 115-125.

greater than one. Otherwise the equally acceptable income of a worker for additional hours of work will increase at a decreasing rate.[14] A value of g of less than one would be inconsistent with a falling marginal rate of substitution of income for leisure as the number of hours of work increased.

The ratio of the product of the share- to the cash-rent system can thus not be greater than one (Figure 3). It can drop as low as e^{-1}, in the case of (1) an almost horizontal indifference curve for labor, and (2) the elas-

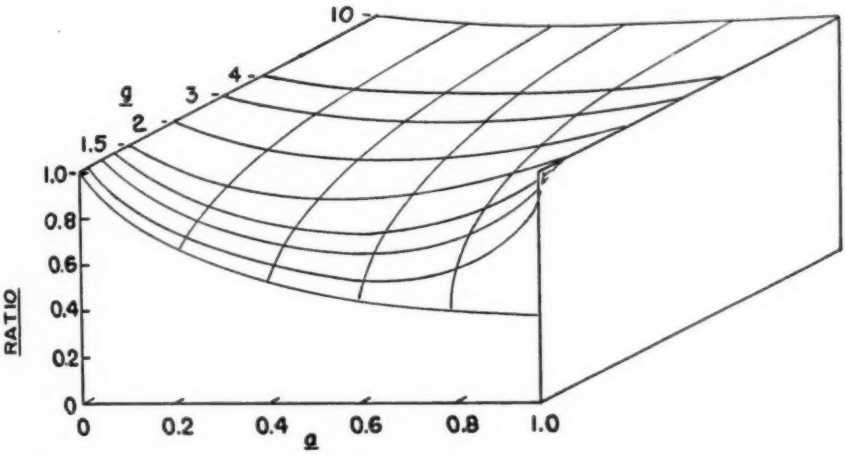

FIG. 3. The Relation of The Total Product of A Share– to a Cash-Rent System of Tenure.

Definitions:

Ratio is the ratio of the product of the share system to the product of the cash system.

a is the elasticity of product (gross income) of a farm with respect to inputs by the tenant.

g is the exponent in the indifference curve for labor, $Y = K + rx^g$

ticity of total farm product attributable almost entirely to inputs (x) by the tenant.

As the exponent (g) in the indifference curve becomes larger it makes less and less difference which form of rent arrangement is chosen. The ratio approaches one when the elasticity of product with respect to the tenant's inputs approaches either one or zero. The main significance of Figure 3 is that in *principle* a share-rent system can not be as productive as a cash-rent system, although it can be considerably less productive.

A limited amount of research has been done concerning the real values

[14] K. E. Boulding, *Economic Analysis*, pp. 742-744.

of a and b, and their sum. Estimates of production functions tend to support the theory of constant returns to scale, particularly in agriculture.[15] Furthermore, the elasticity with respect to inputs of the tenant (a, in the present instance) is estimated, from data, to be greater than 0.5.

Ordinary terms on which farms are rented are consistent with empirical estimates of b, the elasticity of product with respect to land, and the theory in this paper. Theoretically, as has been shown, landlords will maximize rent when the rent charged is equal to b times the total product. Therefore, common share terms such as one-third to the landlord are not inconsistent with the proposition that a in Figure 3 is greater than 0.5 but well short of 1.0. It is common practice for the landlord to make contributions in addition to land. It follows that in practice the share of product going to the landlord should be larger than the elasticity of product with respect to land.

Less can be said about investigations into the value of g. Experimentation with different values of g with any given values of K and r (in the indifference curve function) will show that a value of g very closely approaching 1.0 precludes a decreasing marginal rate of substitution of income for leisure as income increases. A large value of g indicates a sharp upward break in the indifference curve. If the latter should be characteristic of indifference curves it would mean that the supply of labor offered by the individual could hardly be increased by higher wages but must either remain constant or decrease, as wages rise.

Solution of a Hypothetical Model. To show the outcome of a system in practice, let the values of the equations describing the economic environment be as follows:

(1) The indifference curve of labor, in dollars,

$$K + rx^g = 100 + (1/50)x^{3/2}.$$

(2) The production function of a farm, in dollars, with the value of output at $1.00 per unit,

$$P = x^a y^b = x^{1/2}y^{1/2}.$$

(3) The total area of farm land,

$$A = 100{,}000 \text{ acres.}$$

Solving as a share-rent system by equations (1) to (9) in the preceding section it turns out, as expected, that total rent is at its highest level

[15] *Op. cit.*, Heady, Tintner and Brownlee, and the writer. For estimates of production functions in manufacturing industries see works of Paul H. Douglas and others, in *American Economic Review*, Vol. 18; *Quarterly Journal of Economics*, Vols. 52, 54; *Journal of Political Economy*, Vols. 30, 51, and V. E. Smith, *Econometrica*, Vol. 13.

when half of the product is taken as rent [Table 1 and the above equation (2)].

TABLE 1. EQUILIBRIUM VALUES OF RENT, PRODUCT, NUMBER OF FARMS AND ACRES PER FARM IN AN ILLUSTRATIVE SHARE-RENT SYSTEM

Share to Tenant	Acres per Farm	Number of Farms	Total Rent	Total Product
One sixth	4,397.28	22.74	$17,056	$20,467
One third	1,099.32	90.97	27,288	40,932
One half	488.59	204.67	30,700	61,400
Two thirds	274.90	363.77	27,288	81,860
Five sixths	175.88	568.57	17,056	102,338

The inputs by the tenant for all of the share terms, bearing in mind that when the share terms are made worse for the tenant the amount of land per farm is increased, turns out to be 184.20 from (3). The income per tenant is $150, giving an *average* return per unit of labor of $0.8144.

If the farms in the system are rented for cash the inputs by a tenant will be 464.17 units, from (12). The size of farm will be 775.58 acres (14), giving the number of farms at 128.94. The return per labor unit to the tenant is $0.6463, less than the return to a share tenant. This is consistent with a greater total return to the cash renter, the latter being $300.00. The total product of all the farms when they are rented for cash is $77,364 (15).

The ratio of the total product of the share- to the cash-system is $61,400/$77,364, or 0.7936. Using the ratio given by (17) and simplifying,

$$Ratio,\ TP_s/TP_c = 2 \cdot 4^{-2/3} = 0.7936.$$

Comparative Productivity of Share- and Cash-Rent Systems. It was assumed originally that the output of a farm is a function of past and present labor of the tenant, and land, the production function thus including two factors. The product of a farm can be given by

$$P = x^a y^b z^c$$

in which z represents all outlays, including hired labor, by the tenant, at market prices. The exponent c is the elasticity of product with respect to z. The other terms have the same meanings as in the earlier two-factor analysis. This system can be solved for the ratio of total product and total rent with the same assumptions as used before, plus one more. The new assumption is that the tenant will employ factors which he hires or buys, z, to the point where the marginal return from z is equal to its price.

The ratio of total product turns out to be a complicated ratio which can not rise as high as one if $a + b + c = 1$; a, b, and c are all positive, and if g (in the indifference function discussed previously) is greater than one.

The introduction of "capital," or hired inputs, by the tenant does not alter the previous conclusion that a share system can not be as productive in total, in practical circumstances, as a cash-rent system.

Conclusion

A practical interpretation of Figure 3 is not simply stated. A large value of g implies, other things being equal, a sharp upward break in labor's indifference curve. The sharp upward break implies an inelastic supply curve of labor.[16] Thus, if labor will work for so many days, or hours, and take what it can get, regardless of whether it is much or little, then the share-system is almost as good, in principle, as the cash system.

The other variable affecting the ratio shown in Figure 3 is a, the elasticity of the product of the farm with respect to inputs by the tenant. The value of a governs the share of the product of the farm which goes to the tenant. Whether or not he will respond to a larger share of the income going to him (a larger value of a) depends upon how elastic is the supply of labor which he offers. In a situation where the worker will respond to an increase in income with an increase in work, and where a relatively large part of the income produced by himself and the farm together goes to him, the tenant, the share system is at its worst. This is the situation given in the lower right-hand corner of Figure 3. Conversely, if the tenant has or at least exerts little withholding power in the exchanging of labor for income, and if the income of the farm enterprise goes mostly to the landlord anyway, then the share system is almost as good as the cash system.[17]

If it is true, as is claimed, that the share system will be at least somewhat less productive, then why rent on shares? It is impossible to give a detailed answer to this question, but following are some suggestions. It is a common belief that share rent has an advantage for the landlord in that it simplifies control of the farm and prevents depletion by the tenant. In this case, the statement of rent by a cash agreement should be modified, in its formulation, to account for exhaustion of the farm. A short-sighted policy on the part of the cash tenant may offset any gains to the landlord, and to society as a whole, which otherwise should be credited to a cash system.

It is another matter to defend share-rent against operator-ownership. The owner should have a longer-range point of view than the cash renter, and should thus be interested in preserving the value of the farm in the

[16] K. E. Boulding, *op. cit.*, pp. 742-744.

[17] The limits of $a = 1$ and $a = 0$ in Figure 3 indicate all of the elasticity of product attributed to the tenant's inputs, and none, respectively. The ratio approaches one in either instance. In the former there is no rent at all, and in the latter case the landlord takes the whole product. It is recognized that these cases represent mathematical limits rather than likely situations.

same manner as the landlord. Counter to this, owner-operators in some cases may not be able to operate the farms as efficiently as share-renters who have access to the advice, leadership, and credit facilities of landlords. Furthermore, the cash tenant or owner-operator may not have sufficient capital so that he is able to withstand all of the hazards of weather and price fluctuations independently. In an area where these considerations should be important landlords might outbid owner-operators over a period of years.

A third possibility has two conceivable sources. Landlords may have been in possession of the land in the first place, with subsequent conditions such that tenants could not gain a foothold as owners, or, non-farm income, particularly in certain favored lines of trade, may be so much greater than farm income that city people enter the land market simply to find a place to put their money.[18]

If any one of the above possibilities or a combination of them describes a situation, then the landlords have a choice between cash and share leases. The conservational aspects of cash-rent may be unfavorable enough that share terms look good by comparison. The net conclusion is that there is no substitute, from the standpoint of sheer productivity, and irrespective of sociological considerations, for an owner-operated agricultural system. The conclusion is based on a hypothesis that owner-operators are as efficient and as far-sighted, acting in their own interests, as the same individuals would be under the aegis of a landlord, renting on shares.

With all of this many agricultural economists are in agreement. The classic goal of farm management is a productive farm fully paid for. In this paper we have used the ideas of indifference curves and production functions to formulate a notion already widely accepted on bases of observation, intuition, and analysis. Heretofore much of the criticism of periodic spreads of tenancy has been based substantially on sociological grounds, and has risen in large part out of concern for the welfare of tenants themselves. There are grounds for intensive study of tenancy from the point of view of its cost to the level of living of the non-farm public. This cost can be expected to take the form of a comparative reduction in the supply of food and clothing.

Inelasticity of the demand for farm products will tend to increase the comparative *dollar*-productivity of the share system. For simplicity we have assumed infinite elasticity of demand for the output of farms. If the demand is less than infinitely elastic, a different equilibrium will be

[18] One version is the common situation of several or all of the heirs of a farm moving to town. This calls for a payment of all or most of the value of the farm in order that the operator can hold it as an owner.

reached in the case of each system. With elasticity greater than one but less than infinity, the ratio of the market values of the total products of the two systems will be nearer one than shown in Figure 3. An elasticity of one would mean that the supply of farm product would have the same market value, regardless of how much or how little should be produced, by either system. This is a useless argument in defense of the less productive system, however, implying that the amount which the public pays for farm products is a valid measure of their utility.

NOTES

SOME OBSERVATIONS CONCERNING THE RELATIONSHIP OF CONSUMER RESEARCH TO CONSUMER EDUCATION*

AGRICULTURAL economists recently have become engaged in consumer education programs. Up to this date, however, no clear cut decisions have been reached regarding objectives and methods. Nor has consumer education been provided with the special research necessary for the effective operation of its extension program. For these reasons a discussion of the relationship of consumer research to consumer education appears appropriate. Since present programs are limited to consumer education in respect to food, this note will be limited to a discussion of this same area.

Objectives of Consumer Education

One of the difficulties in evaluating consumer education programs or in providing basic research for them is the lack of clearly stated objectives. An examination of the supporting law, a cursory examination of the literature and discussions with consumer educators, however, revealed the following major objectives, either explicitly or implicitly.

(1) One of the objectives stressed by the consumer educator is that of supplying information designed to improve consumer "buymanship." This includes information on food prices, availability, quality, grades, varieties, and seasonal market characteristics. An additional closely related objective is to provide information on the care and use of the purchased foods. In each case, the goal must be to aid the consumers in maximizing their satisfactions from a given expenditure and is based upon the premise that only those consumers who are well informed, i.e. those who know the relative values of goods in use and in exchange within their time and space environment, can make choices resulting in the optimum allocation of their incomes.

This is closely related to the general goal of the economist—to increase the efficiency of the economic system. In a free exchange economy, these decisions determine to a large extent the products which are produced and therefore direct the allocation of resources within the economy. Unless the consumer is well informed, he cannot make decisions that maximize his satisfactions. As a result, the economic system fails to work at optimum efficiency.

(2) Another specific objective of consumer education appears to be to

* Journal Article No. 1377, Michigan Agricultural Experiment Station.

encourage the adoption of more nutritious diets. The social goal in this case is not only to increase the satisfactions of the individual families but also to increase the total social welfare through a more healthy citizenry. The desirability of this latter objective is emphasized by the present national emergency. The health of the nation's people is of utmost importance in periods of international conflict, not only from the point of view of the number of physical rejections from the armed forces, but also, and probably just as important, since the health of the working population affects output of goods and services. The efficiency with which a nation utilizes its total resources, including human resources, is always vitally influenced by the health of its citizens.

(3) A specifically stated objective of consumer education programs is to expand the market for agricultural products through "education" directed toward the consumer with the goal of promoting a sound and prosperous agriculture; i.e., increased income for agricultural producers.[1] This includes the stimulation of the purchase of agricultural products which are selling at depressed prices due to abnormally large supplies. This might be done to the advantage of consumers and producers alike and, because of more perfect knowledge on the part of consumers, would presumably lead to a more efficient utilization of resources.

The attainment of these goals has been established as national policy,[2] and there is little doubt that these are accepted social goals. Public funds are being spent for the educational programs. It is therefore a legitimate function and obligation of publicly-supported research institutions to provide the research necessary for the development of effective consumer education programs.

Contribution of Research to The Consumer Education Program

In planning a consumer education program consistent with the above objectives, the consumer educator will find all kinds of information about the consumer of value to him. The first thing needed is a description of the present situation. Thus, consumer research, by describing the existing consumption patterns, can give the educator the basic information needed to launch the educational program.

A summary of purchase patterns for each population group, when compared with established nutritional standards, and other established norms,

[1] Another possible objective of consumer education, which could be very important, might be to teach consumers to buy in such a way as to reduce the fluctuations in the business cycle. This would be quite an undertaking, but would bear much fruit if realized. It would involve a change in what seems to be basic human behavior. It involves the promotion of habits of thrift and saving in times of inflation and the promotion of spending in other times.

[2] Either directly or implied in the Research and Marketing Act and other public laws.

would point out the population groups most needing the education—it would point out where the educational effort would be most wisely spent. At the same time, this inventory would indicate what type of information is most needed—i.e., where the deficiency is the greatest. It would help locate the groups most likely to respond to the educational effort, perhaps quite unrelated to nutrition. Who fails to take advantage of seasonal food bargains and the like? How do the various consumption patterns deviate from that expected for the well informed and educated consumer? A detailed study of actual consumption patterns is required to answer these questions so fundamental to the educational program.

It is not enough, however, for the educator to know just what is being purchased at what prices. He also must know the "why" behind the purchases. Consumer research must, therefore, concern itself, to a large extent, with beliefs and valuations relative to foods. The consumer behavior in the market place as elsewhere, is governed by the beliefs and values held by the consumer. The function of education is essentially one of correcting those beliefs and values inconsistent with scientific fact, which will in turn influence the behavior pattern. To start, in this case, one must find out what beliefs and values are held by the consumers. Thus, consumer research can contribute both through an actual study of the behavior and related inquiries into the reasons for the particular behavior, and through direct inquiries into the existing belief and values.

Another policy decision in consumer education, to which consumer research can make a contribution, is that related to the choice of educational techniques and media of communication. Besides giving an indication of the effectiveness of the total educational program, which is of course desirable, the effectiveness of various techniques on various population groups for different types of information could be evaluated. The final evaluation must be measured in terms of the induced change in the consumption behavior of those at whom the educational effort is directed. At the same time, this provides the basis for predictions on the probable effects of future educational effort.

Consumer research may also contribute to the normative aspects of consumer education. It is often stated that farm management extension would make a major contribution of it did nothing but inform the other farmers of the better practices being carried on by the better farmers. Every extension man knows that much can be learned from the progressive farmer; therefore a good deal of time and effort is spent studying the economic behavior of actual farmers. It is quite possible that information of similar value relating to the economic behavior of consumers could be obtained through consumer research. In addition to this, any contribution of empirical consumer research to the theory of demand would also aid the

consumer educator in understanding the phenomena with which he works.[3]

The established goals of consumer education have been stated previously in the discussion, and it might be assumed that consumer research should simply be directed toward the attainment of these ends. However, one of the major contributions of consumer research in this field should be related to the development of a program with consistent ends. The nature of the economic problem often leads to conflicting ends as policy objectives. For example, it is quite possible that education leading to the maximization of consumer satisfactions from their food expenditures would reduce the income of the food producers. As has been pointed out by T. W. Schultz,[4] there is little evidence that the general adoption of more nutritious diets would increase the demand for food and thereby enhance the income of the producers. There appears to be no necessary relationship between the increased consumption of food bringing higher incomes to producers, and the welfare of the consumer and optimum allocation of resources. There is even evidence that reduced consumption of food would benefit many consumers. It is only the increased consumption of certain foods by certain people that will increase consumer welfare. However, consumer education is still at a stage where, with adequate information, a consistent program contributing to both these ends could be worked out.

Beyond this, it is not even certain that induced increases in consumption of commodities in "excess" supply during that period would increase the yearly income of the particular producers of that product. And even if it did help the producer whose product was in excess supply, it is far from evident that the income of producers of agricultural products in general would be increased. In fact, it is quite likely that increased demand for any one product, stimulated by consumer education, will result in a reduction in the demand of some other agricultural product and thereby worsen the position of its producer.

Thus, it is evident that an intelligent and consistent consumer education program requires a consumer research program to provide the policy

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[3] Consumer research may also be the cheapest and best way to get an accurate reflection of retail prices. In other words the consumer would be working as a price reporter. It would appear that retail prices should be studied by the consumer educator, in addition to wholesale prices, in order to advise the consumer properly of the best buys, since there is considerable evidence that wholesale prices are not accurately reflected in the retail prices for some of the foods. If considerable effort were spent informing consumers of the seasonal price fluctuations due to seasonal production and the retail price were not adjusted, the program could actually do a job of misinforming. The resulting loss in public confidence could reduce the effectiveness of the whole program.

[4] T. W. Schultz, *Agriculture In An Unstable Economy*, McGraw-Hill, New York 1945, p. 74.

makers with the information (such as the income elasticities of various foods for different groups, price elasticities, and most of all marginal rates of substitution between foods in consumption) from which the total effect of the induced changes in consumption can be predicted.

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COOPERATIVES AND ECONOMIC WELFARE

THE relation of farmer cooperatives to economic welfare is of vital concern in the formation of government policy. Eugene Clark has presented a challenging theoretical statement which suggests that, on the whole, it is doubtful that cooperative enterprise is more conducive to maximizing economic welfare than is private enterprise.[1]

Clark's statement is founded on the assumption that the average entrepreneur who buys from or sells to farmers makes decisions as to the scale of his business. There is the further assumption that these decisions are based on the knowledge that expansion beyond a certain scale of operation will reduce net revenue to the firm. On the basis of these assumptions, he establishes that the difference in objective of the cooperative will lead to a different scale of operation than that for the private firm. He also examines the question of which scale is the more conducive to economic welfare.

Clark's Assumptions Unrealistic

Clark's assumptions, however, are unrealistic. At the local level at least, few businesses dealing with farmers have any opportunity to expand to that scale of operation which would maximize efficiency of operation. In the first place, volume is limited by the size and prosperity of the community served. Transportation costs inhibit extensive encroachment on other communities. In the second place, if there are competitors within the community, it is generally necessary to share the available volume with these competitors.

Substantial inducement often is required to persuade a farmer to transfer his business from a firm which has been giving him good service. If this inducement is to take the form of reduction in price of services, the necessary reduction may be to a level below cost of rendering the services at any attainable volume. Further, the limited number of competitors may mean that a reduction in prices produces a price war from which no firm may emerge with increased volume. Accordingly, the probable goal of the

[1] Eugene, Clark, *Farmer Cooperatives and Economic Welfare, This Journal,* February, 1952, pp. 35-51.

average entrepreneur in businesses selling to or buying from farmers is to expand his business as far as practicable without disrupting the established pattern of margins. Optimum efficiency is unattainable, and, as a result, the entrepreneur has no data as to the desirable limits to set on his scale of operation.

For illustration take the case history of adjoining communities in Alberta, Canada, with which the author is familiar. These communities, which shall be called *A* and *B*, both began to develop with the arrival of railroad service some 25 years ago. *A* has a somewhat larger and more prosperous trading area than *B* and soon developed four retail stores and three grain elevators. *B*, except for a few years, has had only one store and one elevator.

In *B*, the one store has been highly successful. No effort has been made to exploit its monopoly position, and farmers in the area are generally convinced that the margins or mark-ups are usually as low as, if not lower than, those in the stores in *A*. The owners of this store may not have realized large profits, but they have been able to secure a good living from their business. Efficiency of operation probably could be improved if trade could be attracted from a larger area.

In *A*, none of the four stores has been successful. There have been numerous changes of ownership as store operators have exhausted their capital. Despite a greater total volume of business, splitting it four ways has prevented operation at a comparative level of efficiency to the store at *B*. As to the grain business, it is doubtful that any of the four elevators in the two hamlets receive enough grain to attain maximum efficiency of operation.

Under the circumstances of these two hamlets, monopoly is essential to provide marketing services at the maximum level of efficiency. It would also maximize economic welfare if efficient management were secured and its services were provided at cost. However, if monopoly profits are exacted, an inequity in distribution of income results and tends to reduce economic welfare. While the monopoly at *B* probably has not extracted any monopoly profits, it is evident that if private enterprise behaves in the theoretical manner it will endeavor to do so.

Some conclusions may be drawn as to the probable effect of cooperative operation of business on economic welfare in these two communities. At *B*, the benevolent attitude of the owners of the retail grocery business appears to have resulted in a close approach to maximization of economic welfare despite the monopolistic nature of the control. The substitution of cooperative management by the customers of this store would assure that service was rendered at cost and the goal would remain the same, that is, to secure all available business in the area. Both the gas and oil business

and the grain elevator at *B* are cooperatively operated, and this is the goal for each of them.

At *A*, the unfortunate fragmentation of the available volume of business has clearly reduced economic welfare. Costs of the business of retailing groceries have been high as a result of the inefficiency of operating four stores which handle the business not large enough to minimize costs per unit of sales in one store. The organization of a cooperative might either reduce or increase economic efficiency here. If it were able to obtain the greater part of the business, it could operate more efficiently than any of the existing stores. This would clearly involve an increase in economic welfare unless the distribution of income were rendered more inequitable, which would be unlikely with the distribution of savings among patrons. On the other hand, if the cooperative were merely another firm further fragmenting the volume of business, economic efficiency would be lowered and welfare reduced.

One of the firms in *A* is a cooperative and apparently handles about half the volume. Because of larger volume it is more efficient than its competitors. Its farmer members reap the benefit of its higher level of efficiency.

Summary

This illustration reflects the situation with respect to provision of marketing services in many rural communities. In such areas, competition generally lowers rather than raises the efficiency of firms providing these services. Monopoly, on the other hand, involves the risk that the economic benefits of added efficiency will be diverted entirely to its owners. In such circumstances, cooperative organization is often the institutional arrangement most conducive to economic welfare. Some cooperatives actually may reduce it as a result of insufficient volume of business or inefficient management. To determine which cooperatives increase and which reduce economic welfare would be a matter for empirical investigation.

In summary, it is contended that the economic models developed by Clark are inapplicable to the average rural marketing situation and, consequently, his theoretical conclusions have little significance for policy formation. The more realistic view is that the rural business always is seeking to expand its volume. In this situation, assuming the same calibre of management exists, a cooperative will increase both economic efficiency and welfare if it succeeds in securing a larger proportion of the available business than the average private firm in the absence of the cooperative, or if the alternative is a profit-seeking monopoly.

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COOPERATIVES AND RESOURCE ALLOCATION*

EUGENE CLARK specifies divergent objectives for cooperative and private enterprise and works through the effects of the different policies on resource allocation.[1] There is a great deal of economic analysis embodied in this work but the conclusions reached are marred by serious defects. The conclusions are dependent upon the management policy imposed on the cooperatives by Clark. This analysis is open to question on the grounds that this rule of policy was inadvisably chosen and does not represent cooperative objectives. There also is a question of welfare theory involved. This paper will point out the main areas where disagreement may occur and indicate the implications on the conclusions drawn.

The terminology used here may be somewhat different from that used in Clark's article. Consumer and purchasing cooperatives will be treated as the same and producer and marketing cooperatives are regarded as identical. The major emphasis will be on consumer cooperation. Reference to producer cooperation will be specified.

Output Policy of Consumer Cooperatives

The objectives of consumer cooperation will find their embodiment in the management's rule of policy in relation to output. The rule which Clark imposes upon consumer cooperatives as we have defined them is that these cooperatives will minimize the "costs in the purchase of supplies"[2] by the patron. This minimization is done on a per unit basis as the discussion in relation to Diagram II serves to indicate.[3] This rule of management is pulled out of thin air and is not buttressed by any empirical evidence or appeal to the basic beliefs and valuations of individuals who comprise and advance the cooperative movement. Such a rule of policy is completely out of touch with reality and must be strongly qualified.

To be consistent with economic analysis, the objectives of consumer cooperation can be set forth in the following manner: a cooperative will attempt to maximize the utility of its members consistent with the restrictions placed upon it by the cost and demand conditions within which the cooperative finds itself. This rule would result in operation at the lowest per unit cost only under unique circumstances. The demand curve must pass through the point of optimum output of the most efficient size of plant for long-run conditions. The demand must be great enough to per-

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* These comments are based on a thesis prepared under the direction of Professor H. Van Vliet of the University of Saskatchewan.

[1] Eugene Clark "Cooperatives and Economic Welfare" *This Journal*, February, 1952, pp. 35-51.

[2] *Ibid*, p. 36.

[3] *Ibid*, p. 38.

mit adjustment of costs to the most efficient size of plant or the duplication of the most efficient size of plant so that operation at the optimum output is possible. If the demand curve does not pass through the lowest point of the average cost curve either for short or long-run conditions, then Clark's rule of management is inconsistent with the maximization of the members' welfare. The minimization of per unit cost is no longer a rational policy for the cooperative. If the demand curve passed through the average cost curve at a point beyond the optimum, then following the policy Clark stipulates would mean that the cooperative would have to ration its output among its membership. The members in turn would have to purchase the remainder of their requirements as indicated by their effective demand from rival firms. If the patrons of the cooperative purchase a part of their supplies from rival firms, a minimization of the per unit cost by the cooperative would not necessarily lead to minimizing the cost of the commodity to the patron. As long as the patron can satisfy his demand at the cooperative at a price lower than that of private firms, it would be in his interest to do so. The management would therefore supply the goods. This would lead to operation at an output beyond the point of lowest average cost. Thus the management rule which Clark thrusts upon consumer cooperatives can not be defended on theoretical grounds.

Clark's output policy rests on the assumption that the market price is effective in restricting the demand to whatever point on the cost curve the management wishes to undertake. This is indeed a naive position. It does not adequately recognize the effect of patronage dividends on the market reaction of its patron. If patronage dividends are correctly anticipated, the cooperative would be forced to ration output if it wished to restrict output to any selected point on the average cost curve short of the point at which the average revenue is equal to average cost. Setting of a market price is not an effective way of regulating output of a cooperative if patronage dividends are paid out regularly in amounts that do not fluctuate greatly. Rationing is not a universal practice of consumer cooperatives. In fact, once a cooperative limits the quantity that any single member or non-member may purchase at the market price, the question may be raised as to whether or not the enterprise is a true cooperative. Such action violates the principle of open membership and results in inequitable treatment between members. Thus the management rule Clark stipulates is also in conflict with cooperative philosophy and indirectly with the Rochdale principles. This management rule is capable of empirical testing. It can only be upheld if rationing the output among the membership is a universal policy of all cooperatives.

It is a fact that cooperatives in general attempt to satisfy whatever patronage their members bring to them and the membership is open. This

should be sufficient to disprove the statement that cooperatives attempt to limit per unit costs come what may. Cooperatives in their attempt to satisfy the needs and the demand of their patrons as cheaply as possible may find their output pulled to the right due to the effect of the payment of patronage dividends. They may operate at the point at which marginal cost equals average revenue or where average cost equals average revenue. With perfect foresight as to patronage dividends and no rationing of output among members, it is this latter point of output that will prevail. Thus, given identical cost and demand conditions, a consumer cooperative will at all times operate at a point of larger output than will a private entrepreneur attempting to maximize revenue. A consumer cooperative will attempt to satisfy the demand with which it is faced as fully as possible and if patronage dividends can be anticipated on a rational basis the market price policy can not limit the effective demand.

The difference in the output policies of consumer cooperatives and private enterprise has been stated. A consumer cooperative, in pursuing the welfare of its membership, is likely to operate at least up to the output at which marginal cost is equal to average revenue. This is the point Clark specifies as the optimum. A consumer cooperative is, however, likely to go beyond this point. A private enterprise will produce at an output less than either of these points since it will equate marginal cost and marginal revenue.

Clark uses the phrases "competitive purchase" and "monopsonistic purchase" to specify the conditions in the factor markets. These conditions affect the steepness of the cost curves and will not affect the foregoing analysis.

Clark ignores the effect of competition between consumer cooperatives and private firms. Payment of patronage dividends not only increases the output of the cooperative but forces its competitors to meet these lower costs to the cooperative membership. Thus, prices will be lowered and output increased over the industry as a whole.

Management Rule Is Inappropriate

Clark specifies the welfare criteria which he uses to measure the effectiveness of the allocation of resources.

"The average revenue curve is assumed to give the market equivalent in terms of money of the marginal utility of the product purchased. Secondly, it is assumed that the marginal cost curve represents the opportunity cost of using the same resources elsewhere. If these two assumptions are granted, then it follows that production should be carried to the point where marginal cost is equal to the marginal demand price as given by the average revenue curve. This will represent a position of maximum economic welfare, since it will mean that the utility received from the last unit produced is just equal to the opportunity

cost of producing it. Any shifting of resources into or out of the industry would result in a lower economic welfare since resources would not be allocated in terms of consumer demand."[4]

Granting the two basic assumptions, the specification of the welfare optimum does not follow since it is not properly qualified.

The marginal cost curve can represent the opportunity cost of the variable factors only. The cost to the community of employing the fixed factor or the entrepreneur is not taken into account. The welfare criteria Clark uses is, therefore, only partial and can not represent an optimum for the whole of the industry. In fact, conditions represented in Diagrams I and II[5] are not optimum but show conditions in which the variable factors, as well as the fixed factors, must be reallocated to achieve an optimum.

The AR curve in Diagrams I and II[6] does not represent the marginal demand price for the community. The AR curve indicates the average revenue to a single firm from the sale of the product under the assumption that the output of one firm will not affect the price of the product. The output of a single firm is assumed not to affect "the market equivalent in terms of money of the marginal utility of the product." Thus, in this case the average revenue curve is inappropriate since it does not show what it is purported to show in terms of the welfare criteria specified. A sloped average revenue curve to the industry as a whole will indicate the marginal demand price of the community. Allocation of resources within the firm, among the firms, and between industries must be shown to establish an optimum for a perfectly competitive industry. The marginal demand price of the community must be represented for the determination of an optimum since resource allocation within firms alone is not sufficient. We must be able to witness the value of the marginal product to the community for this type of welfare analysis.

Clark's analysis is invalid because the management rule he uses is not appropriate. This is true for all types of market situations. For conditions of perfect competition, not only must the welfare criteria used be rejected but a more fundamental error makes this section of the analysis meaningless.

Imperfect Competition Is Usual Market Condition

Representing consumer cooperatives as operating in areas of perfect competition in the sale of their products can not be defended generally either on grounds of logic or empirical observations. Consumer cooperatives have never been known to operate wheat farms or raise cattle on a

[4] *Ibid*, pp. 38-39.
[5] *Ibid*, pp. 36, 38.
[6] *Ibid*, pp. 36, 38.

permanent basis. They may operate farms for rare or specialized products but never to obtain goods in plentiful supply whose price they can not influence in the market.

A consumer cooperative must pay patronage dividends to justify its existence. If the enterprise operated returns only the alternative costs of the resources used, then patronage dividends can not be paid. This is largely the case of perfect competition. An examination of empirical relationships will show that both consumer and producer cooperatives or purchasing and marketing cooperatives function in areas of imperfect competition. A cooperative at all times in one or more of its phases of operation attempts to influence price in some aspect for the benefit of its patron. It is impossible to explain these types of cooperatives logically on any other grounds. For this reason, cooperative effort is directed toward sectors of imperfect competition or areas in which, for frictional or other reason, price can be influenced for a sufficient length of time to justify the enterprise. Until this basic fact is fully realized the fundamental role of cooperatives in our economy will not be fully realized.

A cooperative will not operate in an area in which a private enterprise will equate average revenue to marginal cost. Clark states, "Production should be carried to the point where marginal cost is equal to the marginal demand price as given by the average revenue curve."[7] In areas of imperfect competition, a private firm will equate marginal cost and marginal revenue. Thus, private firms violate this welfare criteria for the variable factors. A cooperative enterprise, on the other hand, will not violate this criteria on the basis of the maximizing process.

Producer Cooperatives

Clark presents marketing or producer cooperatives as bidding for the produce of the farmer and incorporating the conditions under which this produce is obtained into the cost curves. This may be a true representation in the long run. In the final analysis the effect of the producer cooperative on the market price is the final returns the farmer receives for his produce. This will be an important guide to the price the cooperative and its competitors will offer for the produce. The cooperative does not necessarily vary the market price to obtain more of the farmers' good. There is, however, no set rule in this regard. But, in many areas the quantity of produce the marketing cooperative receives is fixed for the year.

In the sale of the produce, cooperatives will not differ greatly from private firms in their activities. However, they may serve to increase the returns to the farmer by passing on whatever profits they have made and also by providing some services at cost. The effect on community welfare

[7] *Ibid*, pp. 38-39.

will depend on whether restriction is placed on the quantity produced by the farmer and whether some of the product is destroyed or diverted to uses which the community values at a lower level than the main use. These observations apply as well to private enterprise competing with the marketing cooperative.

Summary

Clark's analysis may be questioned for several reasons. The specification of the management policy of consumer cooperatives is too naive. As stated, it is not consistent with the theoretical aspirations given to man in the study of economics, i.e., the maximization of utility. It violates at the same time the basic philosophy of the cooperative movement. There is not presented any empirical evidence that the techniques necessary to enforce such a policy are universally practised by cooperatives. Clark's discussion in regard to perfect competition is invalid because the welfare criteria stipulated is incomplete and because cooperatives do not operate in these areas where resources receive their alternative returns.

Producer cooperatives will improve the allocation of resources in areas where they reduce processing costs which may be above the alternative costs utilized due to imperfect competition. Producer cooperatives may affect resource allocation adversely if price discrimination and restriction or destruction of output is practised in their attempt to increase the proceeds from the sale of the farmer's product. No universal conclusion as to their effect on resource allocation can be reached, therefore, without taking these factors into consideration.

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A FINAL WORD ON COOPERATIVES

PROFESSOR EUGENE CLARK'S rejoinder[1] calls for the following comments.

Clark objects to my proposition that farmer cooperatives have no independent output policy. He asserts that they do not need accept such a state because they have the possibility to attain the optimum output. According to Clark, these possibilities are: (a) in conformity with the laws the cooperatives can "reject applicants for membership" and expel the superfluous members; and (b) the cooperatives "can aggressively attempt to raise volume by methods well known to all active cooperators." The only thing Clark has forgotten is to prove that the cooperatives not only *can* or *can*

[1] Cf. *This Journal*, August, 1952, pp. 404-407.

attempt but really *do* this *for achieving the optimum* output and that this is a generally accepted practice in the cooperatives. Then, and only then, would his argument be of logical value against my proposition.

Members Not Expelled to Stabilize Output at Optimum Level

As a matter of fact if the cooperatives reject some applicants or expel some members it is not done in order to obtain the optimum output in this way but to eliminate those who give trouble and cause the cooperative unnecessary inconveniences of some other kind. Cooperative literature quoted by Clark in his rejoinder contains sufficient evidence for this point of view.

Clark rejects even my proposition that it is not in "the interest of the members to have operations (of their cooperative) carried on at the scale which gives the minimum per unit cost" but at the scale which corresponds to the aggregate output of all the farms of the members. One glance in the membership contract is, however, enough to get a clear idea of the cooperative practice. In this contract the member agrees to deliver *all* the quantity of the produce he has to sell and the cooperative agrees to market it. Now this practice has been adopted not at all as Clark supposes, because "cooperation has social or religious connotations" for some cooperators and therefore "is desirable regardless of cost." Nothing of the kind. The reasons are of a purely economic nature. They include at least the following ones.

Firstly, the enterpreneurial interests of members are vested not in the cooperative but in their farms, the cooperative being only the accessory of the farms. It means that at any time when the cooperative's marginal revenue exceeds the marginal cost of a member's farm plus the marginal charges of the cooperative for marketing his products, the farmer will not hesitate to increase his production and to market it through his cooperative regardless of whether the output of the cooperative is at the optimum level.

Assume that the cooperative would refuse to accept a part of members' produce to avoid increasing the cooperative's output beyond the optimum level. The members would have to market the rest in some other way, thereby losing time, incurring additional expenses and getting lower prices, which would certainly more than outweigh the small rise in the cooperative's cost due to increasing its output beyond the optimum level. No farmer would tolerate such practice in his cooperative and the farmers determine the policy of every cooperative. On the other hand, recent investigations and computations by Professor Anders Östlind in Sweden show that the U-shaped curve for the average costs has on both sides of the mathematical point of optimum a comparatively wide range of output,

within which the increase of the average costs is of practically no importance. This is usually overlooked by theorists but must be kept in mind as soon as the theory is applied to practical cases.

Secondly, the growing output of a marketing cooperative society even provides it with new possibilities to obtain a better price for the given quantity of produce, i.e. to push gradually its average revenue curve to the right. This is usually achieved by an increased bargaining power of the cooperative as well as by larger possibilities to reach central markets, hire better experts, use more efficient advertising, improve the grading, and augment the good-will of the population. This then more than compensates the temporal increase of average costs resulting from passing the optimum level of output.

Thirdly, extension of the output of cooperatives beyond the optimum level is in general a basic requirement for their growth. It is a well-known fact that the size of a plant cannot be adjusted at will, inch by inch to keep pace with the growing output. Before the cooperative can pass over to a larger size plant with a new and more favorable average cost curve, it must have a somewhat adequate output for it.

Those are some of the reasons why the cooperatives are not expelling members etc., to stabilize the output at the optimum level as Clark feels they might do.

There is no reason, of course, to question the conclusion quoted by Clark from Joan Robinson, viz: "If the demand curve were inelastic throughout its length, it would pay him (the monopolist) best to produce an infinitesimal amount and sell it for an infinite price."

But it is rather unpleasant to be confronted with the necessity of pointing out that Clark, by quoting it in this connection, prefers to disregard one or both of the following facts. Firstly, the quoted conclusion applies only to the case of perfect monopoly, i.e. assuming that there is no substitution for the commodity or service offered for sale and that any potential competition is excluded. Secondly, such a situation is impossible for a private firm engaged in the marketing of farm produce, even if it is the only one on the given market. Therefore the above mentioned conclusion of Joan Robinson is not applicable in the instance discussed.

The kind of argumentation applied by Clark is more than unusual in an academic discussion and therefore must be accorded some attention.

No Attention Paid to External Economies

In my first reply, I pointed out that *Clark's* welfare analysis of the cooperative price policy is questionable. This was because *he*—and not the welfare analysis in general—pays no attention to *external economies* the farmer cooperatives create for the reason that *he* uses the curves from, as

he himself says, "the standard value theory." Now, Clark maintains in his rejoinder that I am questioning "the standard welfare analysis" in general.

However, this is not the only case of misinterpretation in Clark's rejoinder and therefore cannot be considered as a lapse. Here is another example. I wrote, e.g.:

". . . all market situations where the farmer cooperative does not have monopoly or monopsony, are imperfect markets with two different prices: the price of the private firm (or firms) and the ultimate price of the farmer cooperative." I said nothing about the prices prevailing when the cooperative has monopoly or monopsony because it was irrelevant for the point I was stressing in this instance. The above quotation of mine sounds as follows in Clark's restatement:

"In fact, Aizsilnieks demonstrates incomplete understanding of this point by limiting his distinction between the initial and final price to 'all the market situations where the farmer cooperative does not have monopoly or monopsony.'"

No such sense can be found in my first reply.

Regrettably enough, a careful reader can find further similar examples in Clark's rejoinder. Of course, my propositions attacked in this way do not lose their validity and for that reason do not need any additional supporting arguments. But one feels inclined to be sorry for a theory requiring this type of argumentation to rescue it.

Does Professor Clark honestly believe that by means of this kind of argumentation, which has no logical significance, the evidence of theories should and could be verified?

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BOOK REVIEWS

American Capitalism—The Concept of Countervailing Power, John Kenneth Galbraith, Boston: Houghton Mifflin, 1952. Pp. xi, 217, $3.00.

The Industrial Economy—Its Technological Basis and Institutional Destiny, C. E. Ayres, Boston: Houghton Mifflin, 1952. Pp. x, 433, $4.00.

Houghton-Mifflin issued two uniquely complementary books within the space of six weeks. Both point out that economics as it is customarily taught in schools, radio commentaries, news columns, and advertisements, fails to describe the American system accurately, and because of this failure can never succeed in giving answers acceptable to a democratic society. After demolishing the traditional system, both describe the economy in terms which to the authors and to this reviewer are considerably more realistic. Next, these books address themselves to the problem of setting up a system to replace the one demolished, a system which will help answer questions and resolve problems. It is in this latter aim that both authors fall short. In view of the elaborateness of the doctrines they have abandoned, it is understandable that in the few pages at their disposal they could not go beyond a skeleton outline of a "more realistic" socio-politico-economic theory.

Both authors use the early parts of their books to restate and criticize the tradition of a free and market-regulated economic system in which distributive social justice would be brought about by each member of society working toward his own economic self-interest. They brush aside as "quibbling" the current literature which proves statistically that there is more competition than monopoly in the American system, or that *effective* competition is just as good as perfect competition. They state that if the system is subject to market control and non-economic forces at *any* significant points, the chain of distributive justice that would automatically follow has been broken. Therefore, they say, the question before America is "what types, among many alternatives, of planning and organization of our social system shall our democratic processes establish or permit?"

The American democratic processes have established and permitted a number of powers and countervailing powers in our system. These include monopolies and monopolistic competition, natural and legal, conferred by trademarks, patents, tariffs, locational advantages, product differentiation, advertising, labor union organization and protection, agricultural price supports and production controls, and many others.

Of particular importance, says Galbraith, are the great retailing chains and powerful middlemen who have set themselves up in a position to command considerable respect from producers who could otherwise ex-

ploit market power against consumers. High profits or even the possibility of high profits and exploitative positions have probably engendered the establishment of countervailing powers. Thus, Big Steel made necessary and possible the creation of Big Labor. In some areas where private bigness was not countervailed by other private bigness, the people of the nation set up countervailing power through government action, as in the case of the agricultural programs.

Galbraith's chapter on "The Case of Agriculture" is an excellent and realistic account of the reasons why America has followed the agricultural policies it has:

> "So, far from being abnormal, given the market power of the industries among which the American farmer is cited and the probability of fluctuating demand, it (market power for farmers) is organic. There would be many advantages in recognizing this. If we fail to regard government support to the bargaining power of the farmer and other groups as normal, we shall almost certainly neglect to search for the principles that should govern the subsidy of private groups by public power. We shall also be less likely to correct the considerable number of abuses which have been associated with government aid to countervailing power—abuses which have been especially numerous and serious in agricultural legislation. Many who might have concerned themselves with these faults have continued to suppose that the remedy is to abolish the entire activity" (p. 169-70).

This statement is a good antidote to that of E. G. Nourse and 12 agricultural economists whose main plea, in a recently-published Farm Foundation booklet, was for agriculture to return to Natural Order.

Galbraith believes that a system of countervailing power has brought far greater technological progress and cheaper goods to the American people than competition would have done. Research is no longer cheap; most of the cheap things have probably been discovered. As our technological complexity becomes greater, the investment necessary to set up even a small research laboratory is great. The profits in monopolistic competition have allowed, and the conditions of monopolistic competition have required, huge industrial research laboratories to be built.

The editors of the June, 1952, *Fortune*, in an article entitled "The New Competition," attempt to make a similar point, but to support a different conclusion. They say that "the new competition," as described by Galbraith and others, has given America more benefits than competition would have, and therefore capitalists can still rightfully ask to be let alone according to laissez-faire principles.

Of course, the system we have has probably given us *more* material benefits, *but not the same ones!* Essential to the laissez-faire doctrine was the knowledge that individual market power could not exist. Upon that basis, government control of any sector of the economy was a mistake. In our society, market power does exist; even though it has not stopped tech-

nological progress, it nevertheless cannot claim the same immunity from social control that the theoretical system could. Those economists who argue that "the real secret of America is to maintain 'effective competition,' or 'workable competition'" are missing the point. Galbraith does not miss this point, and because of that fact, his short and readable book may prove to be the advance publicity for a sorely-needed and much more elaborate description of our social system.

Ayres has attempted just that. He intended his book to be a text for a beginning course in economics. Unfortunately, the intellectual level of sophomores is not as high as Ayres requires. The realistic portrayal of the social complex which will satisfy this institutionalist-philosopher simply cannot be simplified into a one-semester text. This book is probably the best so far, but it will in most institutions have to be used in advanced theory courses in economics and other social sciences.

Ayres spends his first four chapters in economic history and the history of economic doctrines from the viewpoint of an "instrumentalist." A hint as to the content is found in the summary to his Chapter IV: "The capitalist system is a power system . . . centering in the myth of capital . . . the belief that money is the creative force to which we owe the existence of the industrial system, a belief which has been made possible by the use of the term 'capital' in two quite distinct senses [funds *vs.* capital goods] which are nevertheless freely interchanged." Chapters V through XV take up Instability, War, Planning, Taxation, Social Security, Public Works, Welfare, and the Market Mechanism. This order is probably disconcerting to economists accustomed to read first of production as a capital-using process and distribution as a funds-allocating process whereby distributive justice is accomplished. Ayres makes a good case for his arrangement, however. The final chapter takes up "The Destiny of Industrial Society," again on a fairly high plane of philosophical relativism, but by this time the student would probably be a bit more at home with Ayres's own "Instrumentalism" and the philosophy of John Dewey, from which much of Ayres's discussion of "value" derives.

Students who cannot remain awake with John Dewey, John R. Commons, or Veblen, have already responded enthusiastically to Galbraith as a practical political economist and Ayres as an exciting social philosopher. Yet, important practical problems remain scarcely more than mentioned. Even if we accept Galbraith's real world of countervailing powers and attempt with Ayres the "extension of the principles of efficient organization to the entire economy," the problem of maintaining responsiveness to democratic processes is still difficult. Indeed, as Galbraith points out, there are times when the various countervailing powers cease to countervail—in times of inflation the power of labor and the power of industry seem to face in the same direction *against* the consumer; management

rather willingly agrees to wage demands which it knows it can pass on to the public.

As a teacher of economic principles who views even the most "modern" texts with a sense of frustration, and uses them principally as a point of departure from which to argue with the traditional answers, this reviewer is gratified that here at last are two books to add to the slim collection of institutionalist works. More comprehensive work remains to be done before teachers will have a handbook describing our social system adequately and outlining the factors which a democratic society should consider to make its socio-economic decisions. Until more along that line can be written most of our economic teaching, formal and informal, will continue to pay homage to the model of market-regulated equilibrium. These two authors deserve credit for a good start.

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Marketing in The American Economy, Roland S. Vaile, E. T. Grether and Reavis Cox, The Ronald Press Company, New York City, 1952. Pp. xviii, 716. $6.00.

Marketing is defined by the authors as "The activities and organizations, other than the original production of materials and their manufacture, by which all these things are assembled simultaneously for consumption." From this definition, the authors tackle the task of describing and analyzing the "social institution" of marketing in the American economy. The authors divide the book into five parts.

Part I deals with the social task of marketing and the complexity of the system. The complexity of the system also is well portrayed in the other four parts. The authors list two basic tasks of marketing, namely: (1) "to direct the use of resources and allocate scarce supplies in conformity with existing demand and (2) to aid in making consumption dynamic in conformity with changes in our ability to cater to human wants." Relative to their importance, the explanations of these two basic tasks are rather brief and are sometimes vague.

Part II, which deals with the channels of distribution, marketing agencies, and marketing organizations, is perhaps the best section of the book. The importance of marketing in the economy and the importance of various marketing agencies and organizations are well illustrated with excellent statistics from many sources. It seems that Chapter 6, entitled "Collecting, Sorting, and Dispersing," is out of place and should have been included in Part I as part of the marketing task.

Buying and selling operations are discussed in Part III. The organization of these operations and the problems confronting the organizations which are responsible for performing these operations receive primary

emphasis. These functions are discussed from the standpoint of the buying and selling of individual organizations. (Considerably more space is devoted to selling.)

Part IV is a discussion of pricing based almost entirely upon the assumption of imperfect competition (the authors object to the use of the term "imperfect competition," preferring the term "heterogeneous competition.") In the words of the writers, the "discussion will be concentrated upon the broad area of heterogeneous competition in which business operates and not upon the extremes of hypothetical pure competition and monopoly often used for formal economic analysis. The area of analysis is broadly that which in an earlier chapter we called 'administered pricing' to indicate that prices are not fixed automatically by impersonal and mechanical forces but arise out of the policies and decisions of business enterprises." Many students of prices will consider this treatment of pricing inadequate. This will be true especially of students of agricultural prices who do not generally consider prices under pure competition to be altogether hypothetical.

Part V deals with "Marketing Within and Between Regions." This section considers primarily the problem of location of marketing firms and the importance of factors determining trade territories and marketing areas.

The last part of the book discusses marketing controls and marketing efficiencies. Marketing controls by both private and governmental agencies and efficiency of marketing firms and systems are included. Many of the laws and regulations which affect marketing practices and procedures are briefly but thoroughly covered, although those affecting marketing of agricultural products near the farm level are hardly touched upon.

The major part of the discussion on marketing efficiency is concerned with the various methods which have been used in an attempt to measure efficiency. The weaknesses of the various approaches have been emphasized. The authors point out that attempts at measuring efficiency of parts of the system have been somewhat more successful than those at measuring the efficiency of the system as a whole. Part of the difficulty in evaluating the efficiency of the system as a whole probably stems from the fact that the scope of marketing is so great that it is almost impossible to separate the efficiency of marketing from the efficiency of the economy in general.

Throughout the book, much more space is devoted to describing marketing agencies and their activities than to discussing their social and economic implications. More emphasis also is placed on the aspects of marketing relating to the individual firm than to society in general. Certain aspects of marketing are treated in detail, while other aspects are treated rather superficially. Many readers will find much of the book's material of

minor interest, although other readers may find the entire book of considerable interest. Many of the book's generalized statements are subject to various interpretations, depending upon the training and background of the reader. Therefore, the danger of misinterpreting such statements is great.

The organization of the book is such that a rather large amount of repetition is involved. For instance, much of the description of the marketing agencies and organizations given in Part II was necessarily repeated in the discussion of the pricing policies of these agencies and organizations. Readers can find many other instances of considerable repetition.

The book is highly commendable for the numerous footnotes which refer the reader to some excellent literature on practically every subject covered.

The book is written for the beginning marketing student whose training in economics is limited to elementary economic analysis. In the opinion of this reviewer, its basic value will be to the student who expects to associate himself with the sales organization of a firm. However, some parts of the book provide valuable reading for students in all phases of marketing. At most, the book will offer students of agricultural marketing only supplementary reading.

W. E. CHRISTIAN, JR.

Mississippi State College

The Politics of Agriculture—Soil Conservation and the Struggle for Power in Rural America, Charles M. Hardin, The Free Press, Glencoe, Illinois 1952. Pp. 282. $4.00.

Farm politics in the United States has long been a great and intricate game played on a continental scale. The immediate stakes run to billions of dollars and the potential effects of alternative policies are of deep significance. This is true not only in the lives of our several million farm families but also for "the rest of us," including a considerable part of the world's population outside this country. For a sum moderate in these inflationary days you can now buy a seat beside a most discerning observer and critic of this on-going drama. Professor Hardin plays a strong and well-directed spotlight on the struggle for power and economic advantage in rural America, and his analytical commentary is not only mature and urbane but also courageously disinterested. This is by all odds the best book on how-who-gets-what in the current political economy of American agriculture.

The book's 15 chapters are in three parts: The Interests; The Process of Policy Formation; and Recommendations and General Interpretations. The "interests" include the colleges of agriculture, the Extension Services and the Farm Bureau, the SCS and its districts, and the PMA and its

committee system. The "process" chapters are concerned with the politics of administration in USDA, the Congressional field hearings of 1947, the Hoover Commission recommendations and the defeat of the President's reorganization plan, and Secretary Brannan's reorganization order of 1951.

In the concluding pair of chapters, the major recommendation is for a reorientation of farm policies based upon the ideal of *improved farm family living on a conservation base*—in contrast to the inadequate ideals of "parity" and "soil conservation." Concerning organization and process, it is recommended that PMA's political significance be deflated by shifting from election to appointment of all PMA committeemen, but that this shift be contingent upon a legal divorce of Extension from the Farm Bureau. The hope is that many Extension Services, having less to fear from PMA with a modified committee system, would make this legal separation an actual divorce. Another suggestion for a healthier and sounder group process of policy formation and execution is that general farm organizations, presumably interested in the whole gamut of farm policy and other national issues, are to be preferred over the "single-purpose" or "one-commodity" type of organization.

For parts of the book, the author draws heavily on his numerous published articles of recent years, and toward the end the reviewer had a sense of considerable repetition of ideas presented earlier. New readers, who ought to be numerous, will no doubt have little or none of such feeling of repetition.

Occasionally, the author slips into a seemingly naive formulation such as the question "whether administrative agencies can be prevented by law from attempting to influence legislation." In our system it seems quite unlikely that they could actually be so prevented, and probably in many or most situations such prevention would be undesirable. The question should be: what modes (and ends) of influencing ought to be considered legitimate within the framework of our (slowly) maturing rules of the game?

In the Foreword, M. L. Wilson warmly commends this volume to all students of agricultural policy "as a breath of fresh air, even though some of the things it describes are malodorous." This long-needed book, falling with considerable weight on a good many sensitive toes, may make some people "mad" or more so. The author is at considerable pains, however, to reiterate that "Nothing reprehensible, here [p. 26] or elsewhere, is implied. . . ."

In no sense a journalistic exposé, the work is a scholarly, documented, but unstuffy and vigorously written social study which—if read and pondered unhastily—can contribute a deep and rounded understanding of significant aspects of power politics in American agriculture.

Why are sorely needed books like this not forthcoming from land-grant

colleges? Possibly because the colleges, like the PMA, "are inevitably immersed to their ears in the continuous flow of politics"?

FRED A. CLARENBACH

University of Wisconsin

The Soviet Financial System: Its Development and Relations with the Western World, Mikhail V. Condoide, Bureau of Business Research, College of Commerce and Administration, The Ohio State University, Columbus, Ohio, 1951. Pp. xiii, 230. $4.00.

The objective of the book, as the author explains in the preface, is "to analyze the operations and significance of the Soviet financial system and its place and role in the collectivistic economy of the Soviet Union."

In order to fulfill this objective, the first chapter contains, as background, concise characteristics of the Soviet economic organization and the system of the planning. The author emphasizes the limited role of commodity prices in the allocation of the factors of production in the Soviet system and the great role of the authoritative decisions. He is quite conscious of the small influence of the consumers' choice in the Soviet economy, stating that "The distribution between consumption and investment of the national product is decided upon by the government through an authoritarian political decision upon which the individual income receivers have little or no influence." His appraisal of the results of planning is realistic. For instance, on Page 9 he says, "The decision to proceed with the collectivization of agriculture at any price wrecked all hopes of expanding agricultural production during the First Plan."

The following three chapters discuss the Soviet banking and credit system, Soviet money, and the national budget. The organization, function, and scope of operations of the National Bank (Gosbank) are described first. The author emphasizes the role of the Bank in the control of the fulfillment of the plan on the basis of its monopoly of short-term credit. The organization of long-term credit, extended by several special banks, including the Agricultural Bank, also is described concisely. The Russians expected, of course, that by concentrating the double function of finance and controls within the Gosbank, it would be possible to minimize the inflationary pressure inevitable in a system in which individual enterprises are virtually insured by the government against insolvency. The author shows, however, that the flow of subsidies maintained inflationary tendencies in the Soviet economy that resulted in the depreciation of Soviet currency.

The chapter on money gives a very lucid picture of the Soviet monetary system. Condoide does not accept the point of view of the Soviet economists that Soviet money has some kind of "unique" properties because it is used in a collectivistic economy. Equally, he does not agree with their

claims that Soviet money based on social property of the means of production excludes the possibility of economic and monetary crises. On the contrary, he presents a picture of continuous inflation and depreciation of currency beginning with 1928.

In his opinion, the greatest difficulty experienced by the Soviet government during the First Plan was the instability of its currency, and he sees that inflation puts the Soviet economic system under great strain. Furthermore, Condoide doubts that the Soviet planners will be willing to use powerful means of combating inflation in the future. In spite of the Soviet monetary reform of 1947 and the following deflationary policies, he expects that further expansion of heavy industry probably will be attempted again through inflationary monetary policy.

In the chapter on the national budget it is clearly shown that the Soviet budget differs fundamentally from the budgets of other countries, since it includes the greater part of investments and other expenditures under the Five-Year Plans of industrialization. The author points to dangers of accepting official classifications of expenditures, such as expenses on national economy and on defense, since "national economy" includes many enterprises directly related to defense.

Unfortunately, the author accepted to some extent the Soviet classification of the sources of revenues. On Page 95 he says that "from 60 to 70 per cent of state revenue comes from the socialized sector of the economy, the chief sources being the turnover tax. . . ." Further on he says that "In the Soviet Union . . . taxes and collections from the population represents only a small percentage of the total revenue of the state." Of course, the Soviet economists use this classification in order to camouflage the fact that the principal source of the Soviet revenues are regressive indirect taxes on the population. The author should explain that the turnover tax is nothing other than an indirect tax on the population instead of accepting the Soviet classification.

In some other places the author does not always take a definite stand immediately with regard to various theories of the Soviet economists, which he frequently quotes as a secondary source of information when he has no access to official documents and reports. Though such an approach may be understandable when genuine economic theories are under the discussion, it is dangerous when applied to the theories of Soviet economists which necessarily contain at least as much propaganda as serious economic analysis.

The two chapters concerning the relations with Western world, although interesting and competently presented, treat subjects more familiar to the Western reader than those presented in the first four chapters, and they are based less on the Soviet sources of information. Condoide does, however, correctly emphasize that the state monopoly of foreign trade in

Soviet Russia has played a paramount role in the development of Soviet economy. In his conclusion the author does not expect a considerable change in the Soviet trade policies in this respect and emphasizes, on the contrary, that since 1945 the Soviet monopoly of trade has been used for economic and political subjugation of the satellite countries.

The study contains substantial statistical data taken mainly from Soviet sources, primary and secondary. Unfortunately the author does not always analyze them sufficiently in the text. In Table 9, Page 91, which supplies interesting details on the budgetary expenditures on the national economy, a comparison of absolute and relative data indicates that the figures for 1931-33 are incorrect.

Several documents, Russian and American, are given in four appendices. The Bibliography occupies 20 pages. The publication may be regarded as a timely one competently supplying information on an important aspect of the Soviet economy.

V. P. TIMOSHENKO

Food Research Institute
Stanford University

Measures for International Economic Stability, Report by a group of experts appointed by the Secretary-General of the United Nations, Department of Economic Affairs, New York, 1951. Pp. vii, 48. 40 cents.

Economic stability has become one of the major policy objectives of our time. It is not surprising, therefore, that the Economic and Social Council of the United Nations appointed in March 1951 a group of five experts to study the problems involved in securing international economic stability. This group consisted of James W. Angell, Columbia University; G. D. A. MacDougall, Oxford University; Javier Marquez, Mexico; Hla Myint, Oxford University; and Trevor W. Swan, Australian National University. In November of the same year the experts presented a concise report. It compares very favorably with the reports of earlier United Nations expert groups on National and International Measures for Full Employment (December 1949) and on Measures for Economic Development of Underdeveloped Countries (May 1951).

In contrast to the far-reaching proposals contained in the two earlier reports, which the U. N. Economic and Social Council did not find acceptable, the authors of the new Report were content to make recommendations of a more limited nature and at the same time of more practical significance. These recommendations aim at (1) the promotion of greater stability in world commodity markets, and (2) the expansion of the operations of the International Monetary Fund and the International Bank for Reconstruction and Development in the event of a recession.

Both sets of recommendations are of interest to United States agricul-

ture: the first one directly because violent price fluctuations in the world commodity markets threaten to have adverse effects on the economic position of the American farmer and to create difficulties for United States agricultural programs; the second one indirectly because the more depressions are cushioned, the less will agricultural prices be subject to pressures resulting from shrinking demand.

To promote greater stability in the world commodity markets, the authors suggest the use of international commodity arrangements. They would not, however, like to have such arrangements used to maintain commodity prices at artificial levels. On the contrary, they have suggested that the objective should be "merely to reduce fluctuations around the long-term trend." of prices (paragraph 70). Undoubtedly the authors have not overlooked that long-term price trends can with certainty be determined only in retrospect, and that any price fixing runs the risk of getting into conflict with an inadequately-foreseen long-term price trend. But such a risk would be reduced if, as it seems to be the opinion of the authors, those arrangements would not aim at rigid price stabilization but only at "keeping short-term movements of primary product prices, both upward and downward, within reasonable bounds, . . ." (paragraph 85).

The authors have recognized that the problems vary greatly from commodity to commodity and that therefore different types of arrangements may be needed for different commodities, and in the case of some commodities a combination of various types (paragraph 69).

Nevertheless, they have shown some preference for buffer stock arrangements and only these arrangements have they discussed in some detail. Looking at such arrangements as an anti-cyclical device, they have suggested that purchases for an international buffer stock secure foreign currency earnings to less developed countries in a period of a downswing in the world demand for their products. In developing this suggestion, they seem to have had in mind primarily commodities of which the United States is an importer, such as rubber, tin, and coca.

The authors have not overlooked that buffer stocks, or at least buffer stocks alone, cannot be the answer "where the working of the price mechanism would restore a balance between supply and demand only painfully and slowly." They have not, however, discussed the impact of government intervention in the form of national price support programs or of bilateral or regional trading and currency arrangements on the conditions under which buffer stocks or other forms of a multilateral commodity could operate.

It would go beyond the scope of *This Journal* to review in detail the suggestions of the authors for cushioning the impact of a recession upon the world economy by means of increased financing activities of the International Monetary Fund and the International Bank for Reconstruction

and Development. Any effective action in this respect would be welcome from the viewpoint of the interest of the United States and of United States agriculture in maintaining high levels of economic activity throughout the free world. But as long as Congress must appropriate large sums for foreign aid needs, funds for dealing with problems of a possible future recession are unlikely to be obtained.

In conclusion, attention may be drawn to a problem that was omitted in the terms of reference set by the United Nations for the authors of the Report. This is the problem as to what contribution the restoration of a multilateral system of trade and payments could make to international economic stability. The authors have touched on this problem by stressing (paragraph 57) that such a system could not work if raw material prices are permitted to fluctuate too widely. This is true under the prevailing economic and political conditions. But it is also true that the pursuance by many soft-currency countries of inadequate internal financial policies has not only been detrimental to progress toward multilateral trade and payments but it has also resulted in recurrent financial crises in many of these countries. These crises have, in turn, caused international economic instability. This proves that genuine stability in the international economy can be built only upon a fundament of economic and financial strength of at least the key countries of the world economy.

OSCAR ZAGLITS*

Office of Foreign Agricultural Relations

The Legal Status of the Tenant Farmer in the Southeast, Charles S. Mangum, Chapel Hill: The University of North Carolina Press, 1952. Pp. viii, 478. $7.50.

Agricultural economists who advocate improved legal relations between landlords and tenants as a step toward more efficient use of agricultural resources have reason to be grateful to Mangum. He has enriched the already existing literature on the legal status of tenants by an exhaustive treatise.

The Legal Status of the Tenant Farmer in the Southeast offers a complete description and analysis of the laws and court decisions relating to tenancy matters in 11 Southeastern states, and shows the relationship between the law of tenancy with subjects such as contracts and crimes. In 19 of the 22 chapters, the author deals with such matters as: tenancy and cropping contracts and quasi-tenancy relations; oral and written agreements; various means that landlords and creditors have at their disposal to enforce their claims, such as possessory actions, liens, and

* The opinions here stated are those of the author and do not necessarily reflect those of the U. S. Department of Agriculture.

related means; rights and duties of tenants and croppers with respect to the management of the farm or the dividing of the crops, such as improvements and repairs, emblements, and fixtures. One chapter deals with torts and crimes incident to tenancy.

In spite of the technical nature of the text, Mangum has succeeded, where most jurists fail, in writing a readable text which even those not trained in the field of law can understand. He usually accomplishes this by first defining his topic, or setting out the general principles of law governing the specific problem, and then discussing it in detail in the light of the existing law or jurisprudence. Not always, however, is it a simple matter to give a satisfactory definition. For example, what is tenancy? Mangum (p. 35) says it is a "lease contract . . . defined as a transfer of lands . . . for a period of time . . . in return for rent. . . ." But his use of the word "transfer," without stating that the transfer is only for the purpose of having the land *used* by someone else rather than the landowner, may be confusing, particularly since the author later (p. 40) apparently means by "transfer of real estate" the transfer of ownership. That an institution as important as tenancy should not have been defined most accurately is regrettable, particularly since a trained jurist—in preference to legislators or the courts—is best qualified to do so.

Mangum's is a regional study, covering the area of the old South with its more or less homogeneous cultural and economic pattern. Usually for each subject, the legislation and court decisions are described and analyzed in turn for each state, so that the text can easily be used as reference material by lawyers, agricultural economists or in class rooms. His comparative analysis reveals the contradictory nature of solutions often given by the various legislatures and courts. As an example, the author defines "tenancy at sufferance" as "not really a tenancy at all, the occupant being on the premises *without any lawful claim.*" A Georgia Court seemed to have remarked that "tenant at sufferance is a *wrongdoer* in possession without the permission of the owner. . . ." But a Florida Court defined him as "one who comes into *lawful* possession of land *otherwise than by operation of law*"! (p. 135-6) (Italics supplied) Also the treatment of tenancy and cropping contracts is widely divergent in the 11 states.

There is, therefore, a pressing need for modern and more uniform legislation throughout the Southeastern states. Nor is the need limited to that part of the country. Undoubtedly, from a legal standpoint, the status of tenants in the Southeast is not fundamentally different from that of tenants elsewhere. Lack of modern legislation and use of outmoded court principles is appalling throughout the country, and Mangum has done well in pointing out how little legislative action has been taken in the past. Fifteen years ago, Professor T. W. Schultz, in commenting upon the Report of the President's Commission on Farm Tenancy (1937) stated

that there was too much emphasis on action and not enough serious study of the "tremendously complex problem."[1] Since then, a great deal of research has been done in that field, but it has not been translated into legislative action. Although we help solve tenure problems in other parts of the world, we have not yet helped ourselves sufficiently.

An important feature of the book is the critical appraisal of the law and the formulation of "suggested reforms" (Chapter XXII). The author is aware of the fact that the social and economic status of tenants in his region is undesirable (Chapters I, XXI) and that "In the South of today many tenants and croppers are tied to the land in a state of near peonage" (p. 443). An improvement in their status could be brought about by a change in legislation.

One can hardly quarrel with the author's opinion, which is indirectly supported by the evidence that he presents. But one may disagree with his implications that feudalism is the only cause of today's inadequate regulation of landlord-tenant relations. The emphasis that we have put on unrestricted property rights for agricultural land has made the solution of the tenancy problem very complicated. If the rights and obligations of landlords and tenants, now so much out of proportion, are to be balanced, legislative action, to be sure, is necessary. Mangum enumerates various points where improvements can be made, such as: setting up of state-government agencies dealing with landlord-tenant matters; compensations for improvements; arbitration procedures; a longer period for notices of termination; and he endorses the principles of the Bankhead-Jones Farm Tenant Act in some form or another. How state legislatures can be coaxed into spending some thought and effort on improving tenancy laws, is of course a horse of another color. Mangum's suggestions for reforms might go unheeded for some time, but his efforts to educate lawyers, legislators, economists, agriculturists, and farmers through studies of this nature are in the right direction.

This reviewer would have welcomed an attempt by the author to draw up a model legislation in specific terms, a task for which his conscientious research eminently qualifies him. This would have provided a more concrete basis for future legislation.

ERNEST FEDER

South Dakota State College

The Economics of Poultry Management, Harold E. Botsford, New York: John Wiley and Sons, Inc., 1951. Pp. vii, 337. $5.75.

Advertised on the basis of its table of contents, *The Economics of Poultry Management* will probably enjoy good sales, particularly since no other book covers the same subject. But unfortunately the table of

[1] *Journal of Land and Public Utility Economics,* Vol. 13, 1937, p. 207.

contents as a skeleton is more adequate than is the tissue which it carries.

The cadaverous nature of the chapters is not entirely the fault of Professor Botsford; in most instances he has done the best he could with the facts at his disposal. But the paucity of the facts at his disposal serve only to emphasize the research job that is still necessary to answer questions such as: "Under given conditions, what season is likely to be the best in which to hatch chicks for most profitable egg production?" "What circumstances should govern the egg producer's choice between heavy breeds and light breeds?" "Should broiler growers willingly accept dealer financing?" In lieu of principles from which the reader can derive his answers to these questions, Professor Botsford has simply cited studies incidental to those points and left it to the reader to make his own interpretations.

Professor Botsford's book suffers from what must have been a long lapse between the time copy was completed and publication date. For example, having 1949 data at hand as his latest information, Professor Botsford concluded that total egg production was declining from its then current high levels and that per capita egg consumption was tapering off. The facts are that 1950 and then 1951 set successive records for egg production, records which are likely in turn to be surpassed by the 1952 output. The prospective 1952 output will raise average egg consumption to over 400 per capita, a new record.

The book would have profited by more careful editing in the hands of its publishers. For example, after learning from page 208 that "Time and distance from November to December was cut in half," the reader can only infer that the reference is to chore time and travel before and after a reorganization of laying-house furniture. A more serious shortcoming from the point of view of editorial clarity is the frequent practice of printing tables and charts supported with inadequate column headings or legends. This practice enforces a cumbersome and continuous reference to the text in order to establish the significance of many of the tables and charts.

According to the preface, this book was intended for high school and college students and practical poultry raisers alike. Because no other books have yet appeared in this field, it is likely that *The Economics of Poultry Management* will appeal to all those groups, but it should be hoped either that new books will appear on this specialized subject, or that this volume will enjoy a revision (perhaps in collaboration with an economist) so that the public can receive a better discussion of principles than is presently available to them.

EDWARD KARPOFF*

Bureau of Agricultural Economics

* This review is not an official statement of the Bureau of Agricultural Economics.

Burley Tobacco Control Programs—Their Over-All Effect on Production and Prices, 1933-50. Glenn L. Johnson, Kentucky Agricultural Experiment Station, Bulletin 580, 1952. Pp. 112.

Agricultural economists can be justly proud of this piece of analytical work. It deals with a difficult policy problem in a rigorous way reflecting a high degree of competence in economic theory and statistical procedures as well as an appreciation of social processes. The author and the Kentucky Experiment Station are to be complimented on their work.

Johnson develops a series of idea sequences first on the supply side, then on the demand side, and these idea sequences are finally integrated in a conventional demand and supply analysis. But as the reader quickly discovers, Johnson attempts to give each of these idea patterns empirical content. These efforts vary from simple graphic procedures to rather elegant models involving the "simultaneous equation approach" for handling jointly dependent variables; the results are not, however, successful in all cases. Estimates of relationships turn out to be unreliable from a statistical (probability) standpoint in some cases, and in others the data do not lend themselves to the methods employed. But a great deal of empirical evidence is provided, which, when combined with the economic argument, yields some interesting insights into the workings of the Burley Control Programs.

The key idea patterns developed by Johnson are as follows:

First, yields per acre trended upward over the period 1933-49 in a dramatic fashion; these yield increases stem from farm technological advances—particularly biological and fertilizing improvements; but large increases in yield could hardly have been induced by the level of burley prices since burley prices did not increase relatively, and in real terms declined somewhat; and the yield increases occur over a period that coincides with a very considerable increase in the stability of burley prices, the latter of which resulted from the administration of price supports (for some curious reason Johnson never forges the final link in this particular argument, namely, that the greater price stability induced the increased yields via the investment in farm improvements, but the inference threads through most of the bulletin).

Second, the supply curve for burley tobacco is relatively inelastic; this inelasticity results from the use of acreage allotments under the control programs; thus, we can visualize a steeply inclined curve for burley drifting to the right over the period 1933-49 as yields per acre increased.

Third, the demand curve in the free market is a straight line on arithmetic paper with an elasticity of −.5 at the point of averages; but at the level of price support for any given year the curve kinks upward making the curve exceedingly elastic below the level of support; the high elasticity below the level of price supports grows out of the fact that the government acting through farmers' cooperatives stands ready to make non-recourse price supporting loans at the support level; and we may visualize this kinked demand curve drifting to the right over the period 1933-49 as cigarette consumption increased.

Fourth, the configuration of the demand and supply curves for burley is such

as to bring both price and production stability to the industry; the highly elastic demand curve means that prices would be maintained if an unusually large crop of burley were produced; and the highly inelastic supply means that farmers would not expand or contract production greatly in response to a price change; further we may deduce, where the demand and supply curves are drifting to the right but the rates of expansion are uneven, that the configuration of the curves is such as to promote price stabiliy.

Fifth, burley prices were not held unduly high relative to other farm products under the control programs; but control programs did hold market prices above the equilibrium prices that would have existed in the absence of such programs; hence growers experienced rising profits as some of the benefits of advances in productive efficiency were retained by them.

Economists interested in policy analyses might wish that Johnson had devoted some time and space to the alleged inefficiencies resulting from the fragmentation of tobacco allotments and to the longer-run implications of the capitalization into the land of the retained benefits derived from the control programs. But Johnson concentrates on the development of one central theme: (1) the increased price stability generated by the control programs, (2) the widespread adoption of technological advances associated with (or induced by) increased price stability, and (3) the greatly increased yields resulting from the investment in the new technologies.

This policy discussion is distinct from most in that it does not attempt to make value judgements as to the "goodness" or "badness" of the control programs, neither does it reach any conclusions as to "what ought to be." The analysis is concerned with the presentation of quantitative measures where those measures are linked together in a reasoned argument. Thus the analysis aids the grower or the farm leader or the college professor, each of whom has his own value system, to make rational judgements with respect to the programs by informing the individuals involved how the program affected those economic phenomena having value connotations (e.g. efficiency, the distribution of the benefits of technological advance). This is not to suggest that the *relative objectivity* of studies such as this one can or should take policy out of politics; the value decisions still must be made, but it does make a contribution in the way of narrowing and defining the policy issues, and in holding the discussion to those issues.

WILLARD W. COCHRANE

University of Minnesota

Levee Districts and Levee Building in Mississippi, Robert W. Harrison, Stoneville, Mississippi: Delta Branch Experiment Station, 1951. Pp. IX, 254. $2.00.

Man's efforts to harness the world's mighty rivers and prevent their destructive aspects is a heroic chapter in area development and land

reclamation. Methods, techniques, and accomplishments toward the control of the Mississippi River and its tributaries are worthy of the careful study of students of the problem. In the book *Levee Districts and Levee Building in Mississippi,* Robert W. Harrison has presented an interesting and authoritative history of efforts by local and state groups to control floods along the Mississippi River front in the state of Mississippi from early development to the flood of 1927.

Efforts to control swollen rivers proceeded from private to governmental administration involving local, state, and federal cooperation. Early development was undertaken by land owners along the river fronts, assisted by lowland holders farther inland.

The next stage of development saw county governments taking an active interest in levee construction and flood control. Later, state governments organized active programs to rehabilitate and extend the levees. Passage of the federal Swamp Land Acts of 1849 and 1850 made possible greater support for levee construction. The formation of the Mississippi River Commission in 1879 gave added emphasis to cooperation between individual levee districts and the Federal Government. During the last 30 years, the federal government has made large and important contributions to flood control.

Harrison's report on the progress and methods used by individual levee districts such as the Mississippi Levee District shows the magnitude and scope of flood control and the necessity of relating such efforts to overall basin plans. The history of flood control and the problems which remain today support the conclusion reached by the author that "flood control in the Mississippi Valley can never be absolute, it must always be relative, and there must be a constant weighing of costs against the benefits of increased protection."

Students of the problem will find Harrison's book of assistance in helping them to establish a basis for evaluating river basin development programs.

JOHN W. WHITE

University of Arkansas

The Spirit and Philosophy of Extension Work, Compiled and edited by R. K. Bliss, T. B. Simons, M. L. Wilson, Gladys Gallup, Madge J. Reese, Luke M. Schruben. Washington: Graduate School, USDA and The Epsilon Sigma Phi National Honorary Extension Fraternity, 1950. Pp. iii, 371.

During the past half century, rural America has been revolutionized economically and socially. A new way of life has emerged in most respects far superior to that present in any previous period. The home conditions, the health of people, the efficiency in farming, the social and men-

tal development of the people have advanced rapidly. Behind each of these advancements lies great educational change, both in methods of making a living and in ways of living graciously.

Supplying the power that motivated this rural progress was the growing recognition among rural people that science can do something for them—that science is a "tool" which they can use in solving their everyday problems. The development of this profound change in the attitude of rural Americans toward the power and usefulness of scientific discovery has required constant effort to keep before them important new methods and techniques of farming and homemaking. Likewise it has required continuous demonstration of the practical application of modern practices. The wise recognition of this requisite to rural progress by agricultural leaders as early as 1850 led to the creation of the Cooperative Agriculture Extension Service in 1914. From its beginning until today, the Extension Service has accepted as its task and major function the dissemination of useful ideas in agriculture and homemaking and assistance to people in realizing a rural life richer than ever before. The Extension Service is probably the leading agency of adult education in the world today.

The successful development of this important educational institution, cooperatively supported and guided by local, state, and federal governments, has required a far-seeing philosophy and a common spirit of service to rural America. Such a philosophy could not have been supplied by a single individual. Many great American agriculturalists have had a hand in shaping the rationale which has guided this on-going educational movement. There has been basic philosophical threads commonly accepted by all major contributors to extension's development. Until now the great dynamic spirit lying behind the moving scenes of extension's progress has not been characterized except in scattered bits.

Now the story is available in one document. The compilers and editors of *The Spirit and Philosophy of Extension Work* have assembled significant documents, some old, some new, and pieced them together in a way that reveals in one volume the great ideas and ideals that have guided extension's development. The volume provides an intimate insight into minds and hearts of a variety of men and women—leading agriculturalists and homemakers in America—who fashioned and guided the progress of extension work.

The volume consists of a collection of significant papers presented during the last 50 years to important meetings of agriculture leaders. The addresses have been carefully selected and edited by a committee possessing deep insights into the functions, problems, and opportunities of extension work. Contents of the volume are divided into 10 chapters, each of which treats separately a significant idea, problem, or era in the development of extension.

The first chapter, entitled "The New Education," interestingly presents extension work as education with utility, education for use now, that kind of education which has vocational as well as social value. Those with some acquaintance with the development of educational institutions in America and the philosophies which have guided them will recognize this kind of education as something essentially new at the time when land-grant colleges were being established and later when extension work was started. The spirit of the land-grant college movement, the development of the extension ideal, and the views of Abraham Lincoln on agriculture are discussed also in Chapter One.

The second chapter is devoted to the ideas and ideals of outstanding pinneers in extension work. The remaining eight chapters treat in order: "The Development of a National Extension Program," "Organization and Administration," "The Human Side of Better Living," "A Tribute to Leadership," "Increasing Efficiency," "Marks of Progress," "Looking Into the Future," and "Educational Philosophy."

An important characteristic of the volume is its extensive scope. The editors obviously envisioned as its one important objective the coverage of all major areas with which a well-rounded philosophy of extension work must deal. This they have skillfully attained and without sacrifice of significant content. The somewhat chronological organization of the material enables one to visualize at first an emerging and then a lively developing and maturing educational movement in rural America. The volume is more than a penetrating portrayal of the spirit and philosophy of a great rural crusade. It has strength and validity as an historical account of the major events leading to the establishment and inherent in the development of extension education in America. The writing is spirited and forceful.

In view of its objectives, important criticisms of the volume are few. A major item, however, not present which might have added strength and usefulness to the material, is a summary chapter. No attempt is made to draw conclusions. This process is left entirely to the reader. For one to form significant conclusions, therefore, requires careful reading and a very high level of mental gymnastics. This requirement may lie somewhat beyond the motivational limits of many readers.

The Spirit and Philosophy of Extension Work is likely to be judged one of the most significant contributions to a much needed literature dealing with extension education. All persons devoted to the advancement of rural life in America and in other countries as well, should read this volume with great interest, with deep appreciation, and with significant professional usefulness.

J. PAUL LEAGANS

Cornell University

NEWS NOTES

ANNUAL MEETING 1953

Oregon State College will be host to the 1953 annual meetings of the American Farm Economic Association and the Western Farm Economic Association. The meetings will be held jointly on Tuesday through Thursday, August 18-20, 1953 at Corvallis, Oregon.

AWARDS FOR 1953

The American Farm Economic Association will make the following awards in 1953: (1) Award for the best article published in the *Journal of Farm Economics* in 1952, (2) Awards for published reports of research in the field of Agricultural Economics, and (3) Awards for theses submitted in partial fulfillment of requirements for the degree of Doctor of Philosophy in departments administering majors in Agricultural Economics.

Award for Best Journal Article

For the article judged best among those published in the *Journal of Farm Economics* during the calendar year 1952 an award of $100 will be made. The selection will be made by the Editorial Council.

Awards for Published Reports of Research in Agricultural Economics

1. For the year 1953, there will be three awards of $250 each. Each award will be in a different field of Agricultural Economics.
2. Publications including books, bulletins, articles, and pamphlets submitted for consideration will be classified in the following fields, and persons submitting items should indicate the field in which they believe the reports should be classified.

(a) Farm management and production economics
(b) Agricultural marketing
(c) Agricultural prices
(d) Agricultural finance
(e) Land economics
(f) Theory and methodology
(g) Agricultural policy

3. Selections will be made from published research bearing the publication date of 1952.
4. Only publications prepared by persons 40 years of age or less at the time of publication will be considered.
5. A report of research published in the *Journal of Farm Economics* by a person 40 years of age or less at time of publication may be entered and considered for an award for published research. It will also receive consideration for the best *Journal* article, but may receive only one award.
6. The Awards Committee for Published Reports will be made up of seven persons, in addition to the Chairman, representing the various fields which have been designated.
7. Publications must be in the hands of the Chairman of the Committee, Harry C. Trelogan, Agricultural Research Administration, U. S. Department of

Agriculture, Washington 25, D.C., on or before *March 1, 1953*. Eight copies of each publication entered are requested, but fewer copies will be accepted in such cases as articles appearing in national journals or books otherwise available to the judges. In no event should less than three copies be sent.

8. Members of the Awards Committee for Published Reports will not be eligible to submit papers of their own.

9. Announcement of the awards will be made on or before the time of the 1953 annual meeting of the American Farm Economic Association.

Awards for Ph.D. Theses

1. For the year 1953 there will be three awards of $250 each for Ph.D. theses.

2. Theses in any field of Agricultural Economics may be submitted. Theses prepared by candidates for the Ph.D. degree in any department of Economics or Agricultural Economics in the United States are eligible for consideration, when submitted by the head of the department in which the work was done. No department, however, may submit more than one thesis.

3. Selections will be made from theses submitted to a graduate school faculty during the calendar year 1952.

4. A published Ph.D. thesis may be entered in both the published report and the Ph.D. thesis classes but shall be eligible for only one award.

5. Theses must be in the hands of the Chairman of the Committee, Harry C. Trelogan, Agricultural Research Administration, U. S. Department of Agriculture, Washington 25, D.C., on or before *March 1, 1953*.

6. The Theses Awards Committee will be made up of three persons in addition to the Chairman.

7. Announcement of the awards will be made on or before the time of the 1953 annual meeting of the American Farm Economic Association.

HARRY WELLMAN, *President*

Note: The Awards Committee solicits the cooperation of members of the Association in encouraging participation in the program. Recognizing the reluctance of some authors to enter their own published reports, members may encourage them to do so, or arrange for others to submit published reports on behalf of eligible authors.

Announcements of the Awards Program suitable for posting are available upon request to the chairman of the Committee.

See back cover page of Proceedings issue of the Journal for the announcement of the recipients of the 1952 awards.

* * * *

James R. Anderson, formerly of the University of Maryland, has joined the Washington staff of the Division of Land Economics, Bureau of Agricultural Economics. He will be engaged in studies of land utilization.

Marco Baeza, Head of the Marketing Department, has been promoted to Associate Professor at Seton Hall University's School of Business Administration.

Ernest T. Baughman, Agricultural Economist of the Federal Reserve Bank of Chicago, was promoted to the position of Assistant Vice President, effective July 1.

George T. Blanch was appointed to succeed Dr. W. P. Thomas as Head of the Agricultural Economics Department, at Utah State Agricultural College.

Gordon P. Boals has left the Office of Foreign Agricultural Relations to become Director of Export Programs with Miller's National Federation with his headquarters in Washington, D.C.

Karl Brandt, Economist in the Food Research Institute of Stanford University, returned to the campus on August 24 after a six weeks' leave of absence spent in France, Belgium, Holland, Germany and Italy on a Ford Foundation project concerning European integration and social, economic and political cooperation among European business leaders.

William E. Bredo, Division of Marketing and Transportation Research, Bureau of Agricultural Economics, left his present position about October 1 to accept a job as Economic Analyst with the Stanford Research Institute, at Stanford, California.

Bruce L. Brooks, Extension Marketing Specialist at Montana State College, has returned from a semester of graduate study at Purdue University.

John D. Campbell, formerly with the Department of Agricultural Economics of Oklahoma A & M College, has joined the staff of the University of Arkansas as Assistant Economist. He will conduct research on enterprises on cotton farms.

G. Alvin Carpenter, Assistant Director of Extension in Utah, spent the summer at Cornell where he completed requirements for the Ph.D. degree.

Walter E. Chryst has transferred to the Tenure Section of the Division of Land Economics, Bureau of Agricultural Economics, in Washington, D.C. Mr. Chryst was formerly a joint employee of Iowa State College and the Bureau of Agricultural Economics.

G. B. Davis was promoted to Associate Professor of Agricultural Economics at Oregon State College effective July 1, 1952.

Herrell DeGraff spent part of the summer in Mexico advising with the Rockefeller Foundation.

Rollin M. Dennistoun, who received his M.S. degree from the University of Minnesota in June, has been appointed Assistant Superintendent, Minnesota Agricultural Experiment Station.

Bennett A. Dominick, Jr. joined the Cornell staff last winter after completing his degree. He is an assistant professor and is concentrating on extension activities.

Paul L. Farris joined the staff of Purdue University as Assistant Professor September 15. He completed his doctorate at Harvard University in early September. He will be engaged in research and extension in marketing.

W. Lyle Fitzgerald, University of Illinois, has joined the staff of the J. Walter Thompson advertising agency in Chicago.

William S. Folkman, who recently completed work for a Ph.D. degree at Cornell University, has joined the staff of the University of Arkansas as Assistant Professor of Rural Sociology. He will conduct research in membership relations in agricultural cooperatives and teach courses in Rural Sociology.

H. Prentice Gazaway has resigned his position as Assistant Professor of Agricultural Economics at Colorado A & M College to work on a doctorate in Agricultural Economics at Oregon State College.

Anne L. Gessner, of the Fruit and Vegetable Section, is now Head of the History and Statistics Section of the Cooperative Research and Service Division, Farm Credit Administration, U.S.D.A.

Clarence R. Gross resigned from a position in Farm Management Extension at Purdue University on September 1 to become County Agricultural Agent at Fort Wayne, Indiana.

William E. Hendrix, now at North Carolina State College, has been appointed as Research Associate in the Department of Economics at the Univer-

sity of Chicago. He will carry forward his research on the low productivity of American agriculture beginning the first of the year.

John W. Hicks was on leave of absence from Purdue University in August, 1952 to do a research assignment with The Brookings Institution in Washington involving governmental costs in agriculture.

Donald C. Horton of the Bureau of the Budget, Executive Office of the President, taught courses in Credit Policies in Relation to Agriculture and Research Methods in the Social Sciences at the University of Wisconsin during the 1952 Summer Session.

Roy E. Huffman, Associate Professor Agricultural Economics at Montana State College, received his Ph.D. Degree at University of Wisconsin in June, 1952.

Glenn Johnson was appointed Professor at Michigan State College at the June meeting of the State Board of Agriculture. He will assume his new duties about December 1.

Stewart Johnson returned to the University of Connecticut on August 1, following a six-month study of milk pricing and distribution in Great Britain, sponsored by Cornell University. In this study, emphasis was given to the experiences of dairymen, consumers, and milk distributors with regard to wartime and current rationalization (zoning) plans and the methods employed in pricing, handling and distribution milk.

M. M. Kelso of Montana State College, Howard Mason of the University of Nevada, and M. L. Upchurch stationed at Berkeley, California, are President, President-Elect and Vice President of the Western Farm Economics Association for 1952-53. Wendell Calhoun continues as Secretary-Treasurer.

G. E. Korzan was promoted to Associate Professor of Agricultural Economics at Oregon State College, effective July 1, 1952.

Stanley F. Krause, formerly Research Fellow at the University of Minnesota, has joined the staff of the Dairy Section of the Cooperative Research and Service Division, Farm Credit Administration, U.S.D.A.

Fred F. Lininger, former Head of the Agricultural Economics and Rural Sociology Department at Pennsylvania State College, retired as Director of the Pennsylvania Agricultural Experiment Station August 1. Dr. Lininger is now Director Emeritus. He spent the last year in Rome as Chief of the Agricultural Institutions and Services Branch of FAO and will return to Rome this fall as Deputy Director of the Division of Agriculture of FAO.

Francis J. Marschner retired from the Division of Land Economics, Bureau of Agricultural Economics, on June 30. Mr. Marschner had served in the Department of Agriculture since 1915. He is now employed as Consultant with the Food and Agriculture Organization.

Leonard F. Miller has returned to the staff at Pennsylvania State College after a two years' leave of absence as Chief of the Agricultural Plans and Programs in the Paris Headquarters of the Mutual Security Agency.

James W. Neu has resigned from the staff of Ohio State University, to enter the employment of the California Fruit Growers Exchange.

Paul D. McCarty, who has been temporarily employed in the Division of Marketing and Transportation Research, Bureau of Agricultural Economics, has accepted a teaching position at Roanoke College, Salem, Virginia.

L. E. Moberg has returned to his position with the Soil Conservation Service in Arizona after taking graduate work at Oregon State College.

J. J. Morgan and Donald D. Pittman, of the Division of Field Crop Statistics,

Bureau of Agricultural Economics, made a cotton boll-count trip through the South in August and September. The three-week trip covered the major cotton-growing States, with the exception of the Western cotton States. Others from this Division also observed cotton and other crops in various States.

Q. Martin Morgan transferred from the Division of Farm Management and Costs, Bureau of Agricultural Economics, to the Office of Foreign Agricultural Relations of the Department of Agriculture, effective September 2.

J. Reid Parker has resigned as Assistant Agricultural Economist in charge of Forest Economic Research at the South Carolina Experiment Station and will continue his graduate studies at Iowa State College.

George L. Peterson has been appointed as Agricultural Attaché to Denmark. Since 1948, he has been the Food and Agriculture Officer in the MSA-ECA Special Mission to Denmark.

C. W. Pierce, Professor at Pennsylvania State College, has been granted a leave of absence from July 1 to October 1. He is serving as consultant to the New York Milk Market Administrator to consider a proposal for a comprehensive milk order to cover the New York and New Jersey Metropolitan Area.

Clarence Prentice is on sabbatical leave from the Extension Service, Michigan State College. He will be studying at Kansas State College.

Norris T. Pritchard resigned his post at Purdue University July 1 to accept a position in the Division of Transportation and Historical Research with the Bureau of Agricultural Economics.

C. Kyle Randall has returned to his work in the Bureau of Agricultural Economics from a two-month stay in Quito, Ecuador, where he assisted with a training conference sponsored by FAO for Latin-American agricultural statisticians.

Harlund G. Routhe, who received the M.S. degree, University of Minnesota in June, has been appointed Assistant Extension Specialist, University of Minnesota, and is now fieldman for the Southwestern Minnesota Farm Management Service.

R. C. Scott, Associate Professor at Ohio State University, has resigned to enter the employment of the United States Extension Service in charge of Fruit and Vegetable Marketing Extension.

Charles H. Seufferle completed his Ph.D. in Agricultural Economics at Purdue in July, and accepted a position as Assistant Professor of Agricultural Economics at East Texas State Teachers College at Commerce, Texas.

Karl Shoemaker, Associate Professor and Dairy Marketing Extension Specialist in the Department of Agricultural Economics at the University of Wisconsin, will be on leave through December 31, 1952, with the Illinois Agricultural Association to study dairy marketing in Illinois.

F. M. Simpson, recently retired as Director of Agricultural Research for Swift and Company, will be visiting professor of Agricultural Economics at Clemson College during the school year 1952-53.

Harold L. Streetman has returned to his position as Assistant Agricultural Economist at Clemson College after a period of graduate study at Ohio State University.

Frederick D. Stocker, formerly assistant in Public Finance at Cornell University, has joined the staff of the Bureau of Agricultural Economics to work in taxation.

Noel G. Stocker, formerly Credit Analyst with the St. Paul Bank for Cooperatives, has joined the staff of the Dairy Section of the Cooperative Research and Service Division, Farm Credit Administration, U.S.D.A.

Robert P. Story completed his graduate work at Cornell in September and joined the Cornell Staff. He will concentrate on extension work.

Carl C. Taylor, Robert C. Jones, and Ahmed Pasha Hussein (U.S.A., Cuba and Egypt respectively) are being sent by the United Nations to the Caribbean Area and Mexico to survey local community self-help projects, evaluating among other things, the contribution of community social welfare centers to economic and social progress.

W. P. Thomas retired as Head of the Department of Agricultural Economics at the Utah State Agricultural College on July 1. He will continue on a part time basis doing teaching and research.

Abraham Weisblat, Associate in research in the Department of Agricultural Economics at the University of Wisconsin, has received a two-year Ford Foundation Fellowship to study the productivity of agricultural labor in India.

Bennett White, assisted by other staff members of the Bureau of Agricultural Economics' Division of Marketing and Transportation Research, will commute to Charlottesville once each week during the first semester to give a lecture course in agricultural marketing at the University of Virginia. This will be the fifth year that this course has been given in Wilson Gee's Department of Rural Social Economics.

Sheldon Williams, formerly Professor at Alabama Polytechnic Institute, is now coordinator in milk marketing for the North Central Region. He is located at the University of Illinois and is an Associate Professor at that institution.

Lawrence Witt of Michigan State College is in Brazil for the fall quarter bringing up-to-date his earlier studies of agricultural changes and economic development. Upon his return, he will lecture and lead seminars at a number of major U. S. universities under the auspices of the American Universities Field Staff, Inc.

It is called to the attention of subscribers that the *Journal* is now published five times per year. The December issue will carry the proceedings, minutes of business meetings and annual index.

The McCormick Collection, based on the papers of Cyrus Hall McCormick, inventor of the reaper, comprising more than 1,000,000 manuscripts; about 20,000 books, pamphlets and illustrations; and miscellaneous museum objects, consisting of original items, replicas and models of harvesting machines, plows, and other farm implements and machines, has been given to the State Historical Society of Wisconsin by the members of the McCormick Family. This collection is concerned with the life and activities of Cyrus H. McCormick and the history of agriculture with emphasis on farm machinery. The manuscripts range in date from 1738 to 1951.

Dr. Herbert A. Kellar, coordinator of these records, has spent some thirty-six years in building up this collection. Holding a joint appointment in the departments of Agricultural Economics and History at the University, Dr. Kellar will be available, in an advisory capacity, for students and others desiring to engage in research in it. The McCormick Collection is rich in information on varied aspects of social and economic development in this country and as a group presents a colorful cross section of American life, particularly in the nineteenth and twentieth centuries. Preston E. McNall, Professor of Farm Management at the University, played an active part in the negotiations involving the placing of the collection at Wisconsin.

WILLIAM DURRETT NICHOLLS
1885 - 1952

Since it has pleased Almighty God to remove from our Association one of its earliest members, it becomes appropriate for us to pay tribute to the memory of William D. Nicholls.

Dr. Nicholls, Head of the Department of Farm Economics at the University of Kentucky, received his B.S. degree from Kentucky in 1907, his Masters degree in 1915, and his Ph. D. from Cornell in 1926. He was counted among the disciples of the original school in Farm Management and Costs. Volume II (1920) *This Journal* contains an article by him.

A recent significant contribution of Dr. Nicholls to the Association was his illustrious son, Dr. William Hord Nicholls, Agricultural Economist, Vanderbilt University, winner of the Association's $5,000 essay contest award in 1946. As a teacher Dr. Nicholls developed such men as G. W. Forster, Jesse Tapp, F. F. Elliott and J. B. Hutson. As an administrator he contributed to the development and growth of a number of the Association members. As an organizer he promoted the development of all branches of the social sciences in agriculture at Kentucky.

Dr. Nicholls was a user of economics as well as a teacher of it. He climbed the traditional agricultural ladder, was financially successful in life and yet gave generously of his time to church and public school problems. In temperament he was modest, patient, and unassuming. As an administrator he was loyal, confident, and unobtrusive.

He was a member of the American Farm Economics Association, the American Economic Association, and the Rural Sociology Society of America. His contributions are listed in *American Men of Science, Who's Who in American Education,* and *Who's Who in America.*

Dr. Nicholls died of a cerebral hemorrhage on July 17, 1952. At the time of his death he was active as head of his department, yet he was prepared, for his life exemplified the statement:

In life's small things be resolute and great
To keep thy muscles trained.
Knowest thou when fate thy measure takes;
Or when it says to thee, "I find thee worthy,
Do this deed for me."

L. A. B.
H. B. P.
G. L. J.

THE JOURNAL OF POLITICAL ECONOMY

Edited by EARL J. HAMILTON

in Cooperation with the Other Members of the
Department of Economics of the University of Chicago

The December 1952 issue will contain:

The Expected-Utility Hypothesis and the Measurability of Utility ..... Milton Friedman and L. J. Savage
A Sketch of American Business Organization, 1832-1900 .. G. Heberton Evans, Jr.
Toward a General Theory of Price, Income, and Money ..... Edward J. Mishan
Medical Expenditures and Medical Deduction Plans ..... James E. Jensen
Fiscal Policies for Full Employment: A Diagrammatic Analysis .. John G. Gurley
Federal Grants and Resource Allocation ..... A. D. Scott
A Reply ..... James M. Buchanan

Book Reviews and Books Received

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Contents

Volume XLII September, 1952

A Theory of Excise Subsidies ..... E. R. Rolph
Some Comments on Stochastic Macro-Economic Models ..... G. H. Fisher
Production Functions and the Theory of International Trade .... Svend Laursen
A Note on Multi-Country Trade ..... G. S. Becker
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Reviews of Books, Titles of New Books, Periodicals, Notes

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